Alcatel·Lucent Enterprise

Alcatel-Lucent Enterprise Communication Solutions 2013 Offers

Standard Offer

Chapter 12 Management Operations

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This document introduces the Alcatel-Lucent OpenTouch and OmniPCX Enterprise Communication Server, their products and features. All documents associated to this introduction cover most of the aspects for designing offers based on current manufacturers and business partner agreements. They include introductory explanations to position the offer in relation to client needs. References to in-depth documentation are indicated to direct you to product descriptions or product sites.

Who Should Use this Document?

As an introductory offer, this document can be used by Alcatel-Lucent vendors, clients, partners and associates involved with the implementation of Alcatel-Lucent systems.

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1 Alcatel-Lucent Omnivista 8770 Management System

1.1 Overview

Telecom managers need flexible network management tools to deal with the challenge of staying current with today's network and telecommunication advances. The network administration platform has evolved from simply a management tool to a powerful applications suite that monitors employees' activity and informs managers.

The Alcatel-Lucent OmniVista 8770 Network Management System suite is a comprehensive set of applications designed to help telecom managers and administrators in their day-to-day tasks and aid them in making strategic choices in their converged networks, due to reliability, assured availability, performance information, access security, configuration management and telecommunication cost tracking.

OmniVista 8770 provides centralized management for the Alcatel-Lucent OpenTouch line of products:

- Alcatel-Lucent OmniPCX Enterprise Communication Server from release 6.0
- OpenTouch Business Edition and Multimedia Service from release R1.0
- Alcatel-Lucent OmniPCX Office RCE from release 5.0

This modular platform offers a suite of management applications:

- **Unified Management** and **Device Management** (1)
- **Configuration** of a system or the global network
- **Operations Audit** (1)
- **Topology** and **Alarms** management
- Multi-carrier consolidated **Call Accounting** and **Tracking**
- **Performance** (1)
- LDAP Enterprise **Directory** (1)
- Scheduler
- Maintenance
- Security
- External applications

All the applications can be ordered and run separately, except for:

- Scheduler and Maintenance, which are always included in the application
- Topology, which is an additional option for the Alarms Application
- Active directory integration which is an additional option for Unified User Management (1).
- SNMP proxy, which is an additional option with the Alarms Application.

OmniVista 8770's client/server scalable platform can handle a networked or standalone OpenTouch or OmniPCX Enterprise, with up to 50,000 users on one server.

Up to **100,000 users** and 300 nodes can be managed with distributed architecture (one module per server), PCS (Premium Customer Support, form available on the BP web site) is required.

(1) Not available for OmniPCX Office

OmniVista 8770 value propositions:

- **Manage and control convergence**

  OmniVista 8770 provides tracking of Voice over IP calls, for better follow-up of the VoIP traffic and quality, and easy integration of VoIP into the customer's data network.

  Its long-term trend reporting capability aids in planning of anticipated infrastructure upgrades. OmniVista 8770 provides administrators with configuration and tracking of voice and Voice over IP with a combined applications suite.

- **LDAP directory**

  OmniVista 8770 includes an LDAP Directory, based on the Oracle® Java System Directory Server. The Directory is automatically synchronized with the OmniPCX Enterprise network and OpenTouch Business Edition. In addition, any OmniPCX Enterprise users can place a call by simply clicking on the displayed phone number. Administrative information can be added, due to the import/export from other LDAP compliant directories, such as Active Directory®.

  The Directory can be reached via any PC through the intranet via a browser, any workstation on the LAN/WAN via the Directory client, any standard LDAP client (such as MS Outlook®).

  The Alcatel-Lucent Multimedia Attendant Console 4059, OpenTouch Business Edition or Multimedia Service and OmniTouch Unified Communication can access the Directory in the same way.

- **Integrated application suite**

  Though they can be ordered separately, OmniVista 8770 1.3 applications are tightly integrated together for operational efficiency.

  Two examples:

  - Modifying a user's name in Unified Management applies immediately and automatically to Directory and Accounting
  - Right-clicking on any item in Topology leads to the configuration or to the alarms of this item

- **Proactive tool**

  As soon as new information is generated, OmniVista 8770 1.3 sends an e-mail, an alarm or launches an application to notify the appropriate person, for proactive management. For example, the instant an alarm occurs, the information can be sent via e-mail to the network manager.

  In the same way, accounting and performance reports can be automatically generated in different formats (MS Excel, .PDF, HTML, text files) and sent via e-mail to selected people.

- **A distributed administration access**

  OmniVista 8770 integrates an embedded security agent that configures administrator's access rights. Each administrator accesses the applications according to his rights, from his workstation, through the company's LAN/WAN or through the company's intranet via a browser. Several applications can be accessed simultaneously.

1.2 State of the art platform

1.2.1 Client/server architecture

OmniVista 8770 1.3 is a Client/Server Windows application suite that allows multiple users to access its services simultaneously either through a java-based client or through a Web browser.

OmniVista 8770 server and java-based clients runs on Windows® 2008 Standard Edition SP2 and Windows® 7. In addition, the client can also run on Windows® XP.

Windows server is mandatory for the management of more than 5,000 users and more than 10 simultaneous clients.

The OmniVista 8770 1.3 clients run on a non dedicated PC.

The OmniVista 8770 1.3 Server and Client applications can run on the same PC, but for improved performance, it is recommended to install the clients on a separate PC. Additional clients can be housed on external PCs and access the server via the company data network.

The OmniVista 8770 Server may also be accessed through a standard HTML browser such as Microsoft Internet Explorer® or Mozilla Firefox®. All the applications can be reached through the OmniVista 8770 1.3 Web client, with full features.

There can be 30 simultaneous logins to the OmniVista 8770 1.3 administration, via a client or a web client. It is possible to install several client versions on the same PC, plus OmniVista 4760 clients.

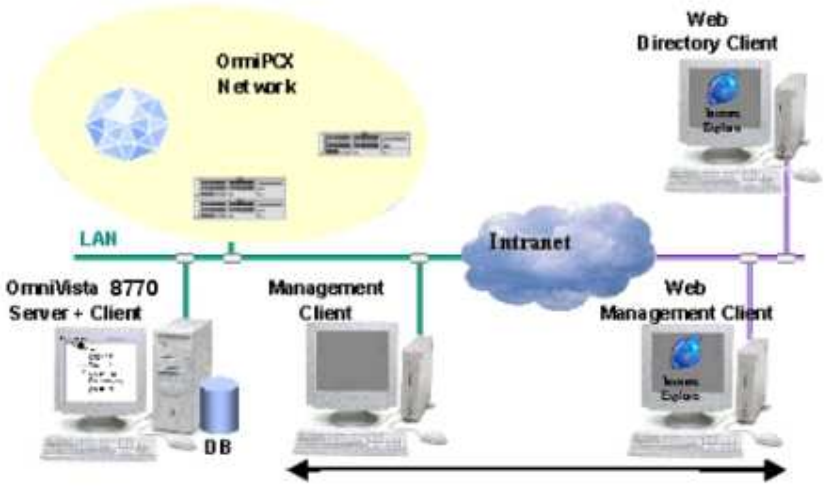
The list of connected clients in the Help displays information on the administrators connected to the server.

For administrators, the Directory can be reached through the Java-based client or the web client (Max. 30 sessions).

For end-users, the Company Directory consultation and update can be reached through a web client (Max. 50 000 users) (1).

For more details about the Directory, refer to the directory chapter.

The standard client allows a greater degree of flexibility by allowing users to easily obtain the tools and information they need, locally from any PC connected to the LAN or remotely through the company intranet.



(1): With a dedicated Directory server, 6 consultations a day including 3 requests each on average, for each user

Minimum hardware configuration:

Model	Client	Server Small capacity	Server Large capacity
Capacity (users)		< 5,000	> or equal to 5,000
Processor	2 GHz	1 processor Dual-Core 2 GHz	1 processor Quad-Core 2.4 GHz
Hard disk	40 GB	80 GB	120 GB, 15000 rpm (disk: RAID5)
RAM	2 GB	4 GB	4 GB
Monitor	4 MB video memory with a resolution of 1024 x 768, 16 million colors		
Partition		NTFS for Sun LDAP server	
DVD drive		Needed	

Software		
Client	Server < 5,000	Server > 5,000
Windows XP Professional SP3 Windows 7 (32 or 64 bits) SP1 Microsoft Internet Explorer (V9 recommended) or Mozilla Firefox 12	Windows 7 (64 bits) SP1	Windows 2008 R2 (64 bits) SP1 Standard Edition

Server compatibility: combined use with other applications (such as Office applications, MS Word, Excel, etc.) on the same OmniVista 8770 server is possible, but the server must not be used as server for other applications, except an FTP server. Domain controller functions, Web server, etc. delivered with the OS must not be installed.

For more details on hardware and software requirements and compatibility, refer to the Installation Manual.

1.2.2 User-friendly interface

The OmniVista 8770 user friendly, Windows graphical user interface has a minimal learning curve which makes things easier for the network manager: network topology views, trees to navigate and select an item, multiple windows, context-sensitive menus, online help, etc.

Multilingual interface

The OmniVista 8770 1.3 software is delivered with the English, French, German, Portuguese, Spanish, Italian, Czech, Polish, Chinese, Slovakian, Korean, Hungarian, Croatian and Russian languages as standard. Additional languages can also be added.

Multiple languages are supported. It is also possible to translate only the reports in the customer languages, to support multi-lingual customer base.

Contextual online help and User guide are available in English, German, Portuguese, Spanish, Italian, and French.

The Installation guide and Security Guideline are available in English, and French.

Browser and client common interface: trees and tables

Because the OmniVista 8770 application is available through a browser as well as a client interface, a common user interface has been defined for the various administration applications such as User Management, Configuration, Topology, Accounting, Alarms, … in order to simplify user training.

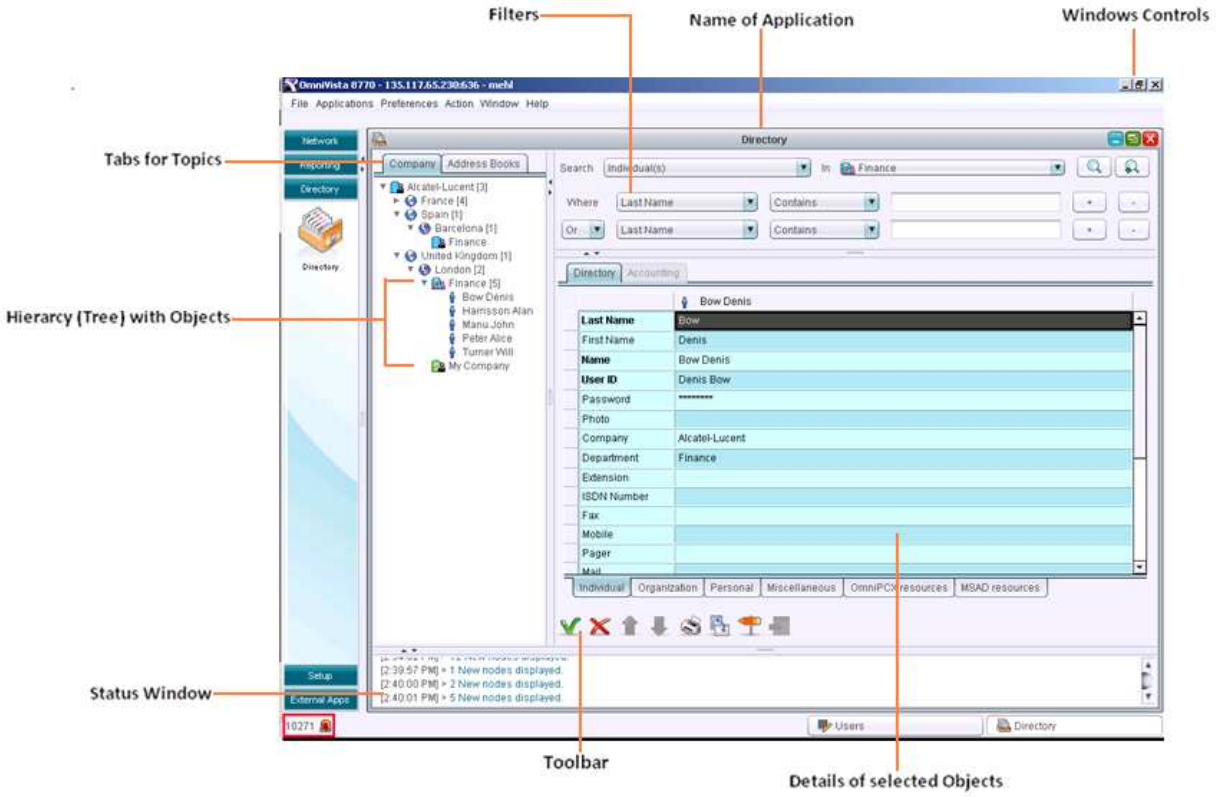
In both interfaces, and for all the applications, there are two main parts in the main window: the tree (left hand-side of the window) and the table (right hand-side of the window).

In the tree structure, the user can display different objects (e.g. sub-networks, nodes, users, etc.) by contracting/expanding directories. In the tree, the user can select the objects to be viewed in the right panel of the window.

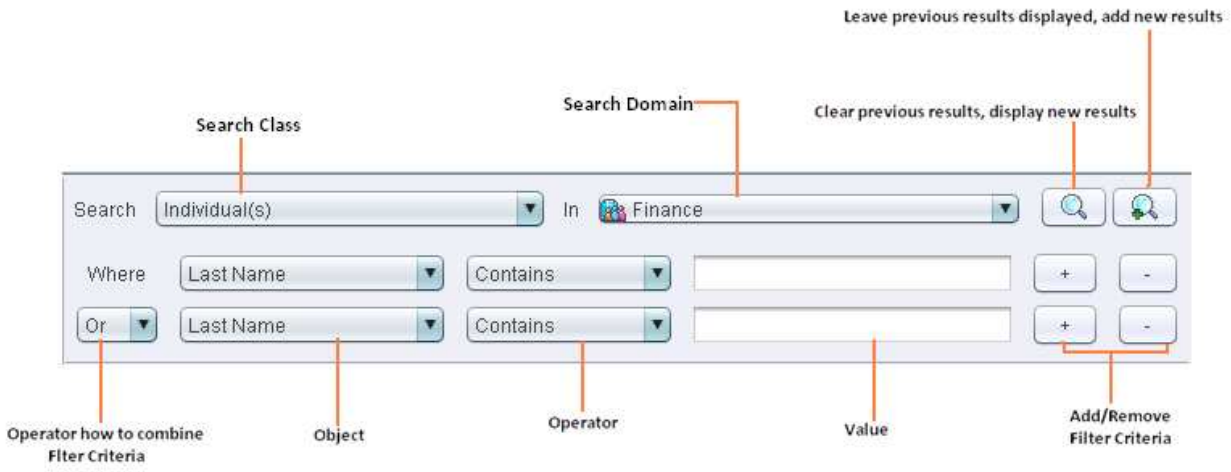
The table displays the objects selected in the tree, depending on the application (e.g. in Topology, a map appears instead of a table).

An administrator can initiate a multi-criteria search (e.g. a person in the directory, a board in a node, all the major alarms, etc.) using the filters above the table.

Example 1: Sample client interface: Directory application



Example 2: Filter dialog box (detail)



1.2.3 Security features

The main security features in OmniVista 8770 1.3 are:

- Embedded security agent to harden login/password policy rules or to interoperate with a Radius server for external authentication
- Access Profile definitions to restrict access rights to all or any configuration actions (access to OmniVista 8770 applications, access to objects and attributes in the Configuration module, management by domain)
- Backup and disaster recovery process
- Automatic authentication and encryption of the communication flows
- Support of OmniPCX Enterprise Passive Communication Server (PCS) for a secure network
- Single token per login account (can be activated or not), prevents the administrators to open several client sessions with the same login, except Adminnmc account.

Embedded security agent

Role-based access control and configuration per domains is implemented on OmniVista 8770. Pre-defined profiles are supplied within OmniVista 8770.

The OmniVista 8770 embedded security agent provides access profiles as well as login/password security policy rules and external authentication (through a Radius server).

The user identification (ID) is performed through a login and a password.

There are access controls to the different applications with predefined and customized profiles. The Configuration, Accounting and Directory application provides advanced access level and domains.

- Customized access profiles

  Customized access profiles can be defined for each user: the administrators who have access to the Security application can grant a different access level for each user. This access level can be different for each application, i.e., Mr. Smith has "read" access to the Alarm application, access to his own Reports only and no access to the Configuration.

- Predefined access profiles

  In addition, to simplify an administrator's task, predefined access levels have been created according to standard profiles. These profiles are listed in the Security Management application as administration groups. When a user is a member of one of such group it inherits the rights of the group.

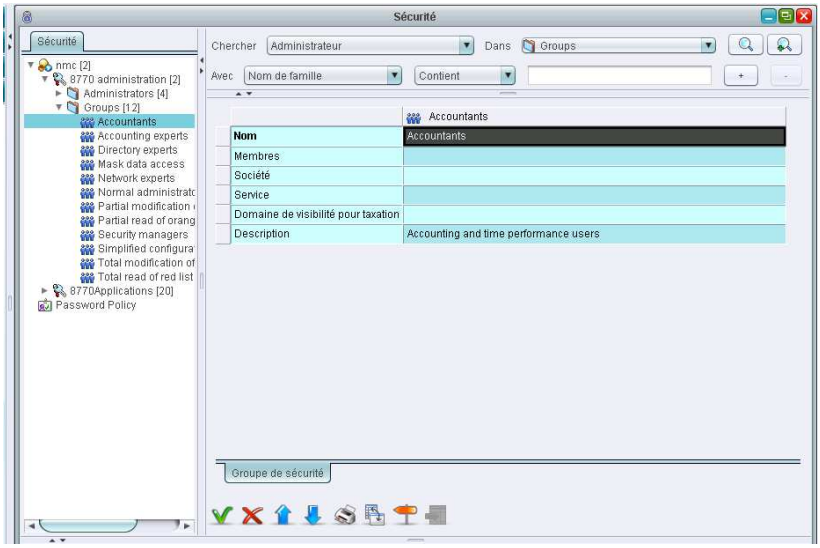
The users with the simplified management profile can only manage users, hunting groups and speed dial, with reduced set of attributes. Through this profile, a non expert can perform simple and common configuration operations, allowing expertise optimization. This profile can be tailored to the customer's needs (managed objects, attributes …).

The profile "Access to the masked information" allows the addition of more information in the accounting reports (telephone numbers, real call costs, PIN, etc.). For further information, refer to the Accounting section. The administrators have access to the masked information.

This is a summary of the access levels to the OmniVista 8770 1.3 applications depending on the user profiles: The Security application allows the management of the access levels, login, passwords, etc.

The default profiles are groups declared in the security management application. Each of these groups has different access rights per OmniVista 8770 application. The members (OmniVista administrators/users) of such group inherit the right of the group.

The security administrator can create a new group and allocate new application rights to get a new profile definition.



Default profiles

Predefined accounts

In addition to the predefined access levels for specific people with a password, there are also predefined accounts within OmniVista 8770 1.3, which are not specifically granted to everyone but only to a specific type of user (e.g. attendants).

These predefined accounts allow OmniVista 8770 1.3 applications to start immediately, even if, for example, there is no user login and password configured in the directory.

There are 2 predefined accounts:

- Adminnmc: This is the default access to start the server for the installer. Only the Administrators can view this account. The password is created during installation and this account has full administration access.
- Alcatel-Lucent 4059: in the Management directory. This is the common account for attendants using an Alcatel-Lucent 4059 Multimedia Attendant Console, allowing them to

have access to the OmniVista 8770 1.3 directory with no restrictions from their switchboard.

The Management directory can be viewed by anyone with access to the orange list and can be managed by the members of the group's Total modification company, Network Expert and Directory Expert.

The Security Administrator for the OmniVista 8770 NMS can display a grid of the access profiles. The profile grid includes the following lists: The grid can then be printed or exported as a text file.

- Users
- Predefined or customized administration group
- Member of each group
- Applications with the user or group access levels (for each application)

The grids can be printed or exported as a text file.

Login/Password Policy Rules

As of OmniVista 8770 1.0, administrators with a "Total modification company" profile can implement one or several login/password policy rules. Passwords are encrypted.

Aging password: users must change their password according to a schedule. A pop up notifies the users that their password will expire soon, and that they can change it. It is also possible to ask users to change their password after a first login or a reset.

Password syntax checks that a password does not match values like name, surname, etc.

Password history prevents users from reusing passwords.

A minimum password length ensures that users cannot provide a short password. Passwords with more characters are exponentially harder to guess.

The password locks when the maximum number of failed attempts has been reached.

The combination of the access profiles and password policy rules provides flexibility, accuracy and security in OmniVista 8770 1.3 access.

OmniVista 8770 Redundancy and Disaster Recovery Process Solutions

Many customers have high requirements for reliability at system level and at application level. The focus is on a Disaster Recovery Process for OmniVista 8770 1.3 application.

Backup solutions:

- **Automatic OmniVista 8770 1.3 database save**: CDRs, performance counters, carriers tariffs, reports, LDAP directories, etc. can be regularly and automatically saved on a directory viewable by the server
- **CDRs automatic archive**: Multi-Time Zones accounting
- **Defense against database saturation**: there are warnings if disk usage exceeds specific thresholds. Two thresholds can be set up, when the disk usage exceeds the first threshold, a minor alarm is generated, and a major alarm is generated when the second threshold is reached. There are also automatic purges of data older than a given period, with filters, automatic defragmentation of the ASA/LDAP databases, etc.

Mechanisms that can be proposed for disaster recovery:

- **RAID5** to secure the OmniVista 8770 1.3 Database (CDRs, reports), onto Network Drive, for example
- **UPS** to secure the PC servers against power outage

– **OmniVista 8770 Redundancy**

The OmniVista 8770 platform can be replicated: a second server can be installed in two different modes:

– Stand-by:

A second server can act as a standby server (hot), ready to take over quickly and provide the same level of service. In case of failure of the nominal server, the client needs simply connects to the standby server.

– Passive server:

The second server can be a passive server (cold), with same setup as the nominal server, ready to be booted and loaded with the nominal server backup, and manually placed into service.

Hot standby server

For maximum assurance, Alcatel-Lucent recommends the installation of a second OmniVista 8770 NMS server.

In this type of configuration, redundancy consists of a (hot) standby server. The standby server participates in synchronization processes each night with the OmniPCX network and the active OmniVista 8770 server.

Data synchronization process:

– The OmniPCX and OpenTouch supply IPT information (configuration, incident, monitoring, accounting and traffic observation CDRs, VoIP tickets) to both servers

– Directory data is supplied by a replication mechanism (automatic or based on LDIFF files)

Other components require dual management and/or regular export from the active OmniVista 8770 server to a network drive and regular import from the standby server.

Administration User procedure: When the active server is unavailable, the client users simply change their connection to the address of the standby server.

Passive server for backup/recovery

In this type of configuration, backup consists of a (cold) standby server in conjunction with the backup file from the nominal server. The OmniVista 8770 backup file includes the entire database and folder data required to restore the service supplied by the nominal server file (list of OmniPCX / OpenTouch, incidents, call records/tickets, etc.).

The passive server is configured with the same settings as the nominal server (hostname, IP address, drives, OmniVista 8770 installation setup: folder, database password, company name, etc.). However, the passive server remains inactive.

Backup/Recovery process

If the nominal server fails, the passive server is booted up and the backup files from the nominal server must be restored.

There is no specific restriction. It is possible to deploy two redundant OmniVista 8770 servers in different sites provided each OmniVista 8770 server can connect to the OmniPCX and all OmniVista 8770 clients can connect to each OmniVista 8770 server.

There is no OmniPCX configuration and synchronization restriction, as both servers work on the local OmniPCX configuration database and process OmniPCX data separately.

To ensure that matching data is in service in both, the system manager performs individual administration on each server:

– Share the list of managed OmniPCX and synchronization options

– Perform the identical customization on each of the servers, reports, etc.

Master-slave replication is available for directory synchronization. When replication is active, changes register on the master (or take effect on the slave server and are then relayed to the master server).

Load balancing architecture

One option is to have OmniVista 8770 Dual-server configuration without automatic switchover.

A pair of OmniVista 8770 NMS servers can be configured to run simultaneously in active mode, sharing the load of administrator requests.

Both servers can manage the same list of OmniPCX Enterprise systems and OpenTouch systems. If one server fails, administrators who were on the failed server perform their own individual switchover.

Administration user manual switchover: When their own active server is unavailable, the client users change their connection to address the standby server.

Workflow support upon switchover.

A dual-server configuration is engineered to handle the anticipated shared load. This means that if one server is lost, the number of simultaneously connected administrators is limited to the capacity of the remaining server. To support the entire workload, the server pair would have to be over-engineered to handle the maximum workload.

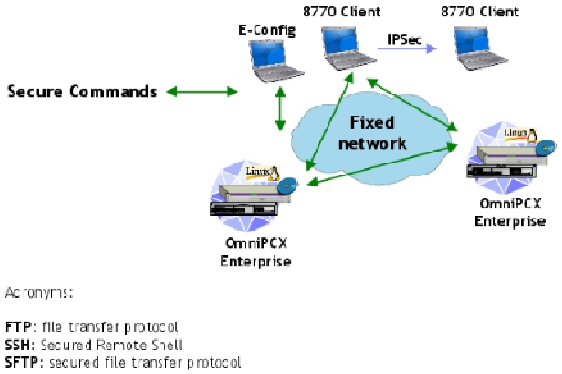
Communication flows automatic authentication and encryption

Secured protocols are implemented between the OmniVista 8770 Server and the OpenTouch: SSH for the OpenTouch Backup, https for the OpenTouch Configuration and VoIP tickets retrieval, SNMP V3 for the alarms and performance monitoring.

Secured protocols can also be implemented between the OmniVista 8770 Server and the OmniPCX Enterprise: SSH is used for secured Telnet (OmniPCX Enterprise configuration – technical interface) and SSH/SFTP for secured file transfer, for example, for OmniVista 8770 Accounting and Performance.

Mixed networks with secured/non-secured OmniPCX Enterprise are possible, combining FTP/SFTP.

The Security commercial option provides the encryption of OXE file/data transfers and the password required for connecting.



– OmniVista 8770 supports Windows® IP Sec for the exchanges between the OmniVista 8770 server and client(s). Windows® IPSec provides the mutual authentication of client(s) and server, the exchange encryption, and a mechanism for non-corruption of data.

Windows® IP Sec strategies for OmniVista 8770 1.3 client(s) and server are offered with the Security commercial option.

– Reduction and configuration of the number of dynamic IP ports

In a secured environment, firewalls or filtering routers must be managed or must be able to open dynamic IP ports used by the applications. Either the firewall creates the filters dynamically during the application's exchanges, or static filters must be managed and all the potential dynamic IP ports opened.

In the second configuration, it is important to reduce the number of open IP ports of a firewall when it is located between the OmniVista 8770 server and the OpenTouch(s) and OmniPCX Enterprise(s), and also between the OmniPCX Enterprise and IP devices. This range of ports has been reduced.

– Centralized authentication through an external Radius server

The OmniVista 8770 server can become a Radius proxy which forwards all the authentication requests to a Radius server. In this case the OmniVista 8770 client login/passwords are authenticated by a Radius server. It is possible to forward only the administrators login/password to the Radius server, and not the web directory users.

OmniVista 8770 login/password policy cannot be used when the external authentication is activated.

Support of OmniPCX Enterprise Passive Communication Server

The OmniPCX Enterprise Passive Communication Server (PCS) provides call handling services to a media gateway or group of media gateways (resp. MyIC Phones 8082) in case of unavailability of the OmniPCX Enterprise (resp. OpenTouch server).

OmniVista 8770 1.3 centralized administration makes it possible to see the solution as a single OmniPCX Enterprise.

Auto-discovery of PCSs is performed through synchronization of nodes. PCSs are automatically represented in the OmniVista 8770 1.3 configuration, system directory and maintenance in a hierarchical structure: a Call Server owns "n" PCSs. Regarding provisioning level, a PCS is counted as a node.

OmniVista 8770 provides seamless accounting and VoIP performance reports for the OmniPCX Enterprise including one or several Passive Communication Servers.

When the PCS becomes active, it may produce accounting and/or VoIP performance CDRs. These CDRs are taken into account by the OmniVista 8770 1.3 accounting and VoIP performance applications to generate consolidated reports.

The Configuration application provides access to the PCS through a Telnet or SSH session. The OmniVista 8770 configuration is not made available for PCS. When the automatic database synchronization PCS/Call server is made, modifications made on the PCS are lost.

PCS alarms are notified by the OmniPCX Enterprise Call Server. The PCS does not appear on the OmniPCX Enterprise intermediate topologic views.

Version download provides immediate or scheduled software update of one or of a set of PCS. The GUI is the same as the one existing for OmniPCX Enterprise software download. Download can be direct from the OmniVista 8770 1.3 server to the PCS or through a PCS master.

1.2.4 OmniVista 8770 server/OmniPCX Enterprise and OpenTouch connectivity

Information collection can be done manually or automatically with a frequency that can be specified. If a link failure occurs, a recall procedure is automatically activated on a regular basis.

– Local or remote IP connection

The OmniVista 8770 server can be connected to an OmniPCX and OpenTouch locally through an Ethernet TCP/IP connection, for local or remote management through IP

- Remote IP/VPN connection

The minimum bandwidth requirements are:

- 64Kb/s between server and OmniPCX
- 300Kb/s between server and master OmniPCX for software download

1.2.5 OmniVista 8770 server/clients connectivity

OmniVista 8770 1.3 Clients are connected to OmniVista 8770 Servers via Ethernet local (LAN) or remote (WAN). A minimum bandwidth of 128 kbps must be provided (512 kbps recommended).

For example, an administrator may access the network administration (using the OmniVista 8770 client) or the directory (using a browser) from home, via an intranet.

1.2.6 Provisioning level

The maximum number of PBX users managed within the network is **50,000** for a Full Pack server, including: User Management, Alarm, Accounting, Past-time Performance and Directory. Beyond this limit, management solutions using specific architectures are proposed through the PCS (Premium Customer Support) process (form available on the Enterprise Business Portal).

The maximum number of managed OmniPCX nodes per OmniVista 8770 1.3 is **300** – a PCS is required beyond 300 nodes. OpenTouch and OmniPCX Enterprise Passive Communication Servers are counted as nodes.

The number of users in the network is automatically checked when the OmniVista 8770 application starts, and periodically during the life of the product. If the number of users exceeds the OmniVista 8770 1.3 capacity, alarms are generated, and it will no longer be possible to launch OmniVista 8770 clients.

All the users of the OmniPCX and OpenTouch network must be included for OmniVista 8770 capacity, including virtual users (except virtual users with analog sets and an unjustified charging COS).

For example, it is not possible to order OmniVista 8770 1.3 for 1,000 extensions, when the total number of extensions in the network is 1,500: in this case, OmniVista 8770 1.3 automatically counts the number of extensions the first time it is connected, but does not start when there are not enough authorized users included in the OmniVista 8770 1.3 license.

All OmniVista 8770 1.3 applications have the same capacity: for example, it is not possible to order accounting for 100 extensions, and Unified management for 200 extensions: the OmniVista 8770 1.3 platform would provide accounting and Unified management for 200 extensions globally.

There can be **30 simultaneous logins** to the OmniVista 8770 1.3 Administration, via a client or a web client.

Directory: 200,000 entries can be stored in the OmniVista 8770 1.3 Directory.

Remark: The response time may increase significantly beyond 50 simultaneous accesses to the directory.

Accounting: 30 million CDRs can be stored in the OmniVista 8770 1.3 database. Beyond this limit, CDRs must be archived. The accounting application can handle up to 500,000 CDRs a day.

Configuration, Directory, Accounting/Performance: up to 10,000 lines can be displayed in a grid.

SIP Manager: **up to 5,000 SIP phones**

1.3 Directory

Because a company's success depends on its people, a corporate directory is a key success factor for efficient internal communication. The directory needs to be flexible and able to assist every employee with quick and relevant information on their desktop.

The directory application included in the Alcatel-Lucent OmniVista 8770 Network Management System is designed to address a converged infrastructure and provide information on all desktops. It works with the main enterprise directories as part of a unified directory strategy based on the LDAP standard.

The directory is also used to organize the users for the unified management module.

The OmniVista 8770 company directory feature is available for OmniPCX Enterprise and OpenTouch.

The OmniVista 8770 Directory is based on the Oracle Directory Server Enterprise Edition R11, LDAP V3 compliant, and provides:

- Import and Export in LDIFF (LDAP Directory Interchange File Format)
- Access through Alcatel-Lucent clients such as Alcatel-Lucent multimedia Attendant Console 4059, OpenTouch and OmniTouch Unified Communication systems
- Access through standard LDAP V3 clients
- Synchronization with other Directories, including Microsoft Active Directory
- Access by LDAP commands

The OmniVista 8770 directory server can be synchronized with an external LDAP server. This process can be automatized thanks to a specific LDAP connector. This later performs a regular automatic synchronization between two LDAP sources (fields mapping, selection of master fields between the two sources, etc.). The OmniVista 8770 scheduler allows to make this synchronization regular, following the specified planning.

The integration with the external LDAP directory can be extended in order to provide the possibility to provision users from the external directory (for instance Microsoft Active Directory). Refer to the User Unified management chapter for more information.

There is automatic database synchronization between distributed Alcatel-Lucent Enterprise servers and the OmniVista 8770 directory server. For example, when there is an update of a cost center or a name in the company directory, it automatically updates the cost center and the name of the user in the OmniPCX Enterprise and OpenTouch database. Alarm license is needed for real-time update, otherwise Directory is updated during daily synchronization.

No need to manually update multiple directories means reduced TCO.

Any terminal with a **Web browser** is now able to access the directory information via a user-friendly interface.

In addition, any OmniPCX Enterprise user can place a call by clicking on the **displayed phone number**. Security management automatically checks the access rights of the user, through their login and password. A first level access is available without any login/password.

The OmniVista 8770 directory can contain up to 200,000 entries. These entries are grouped in the company directory **organization tree**. This hierarchical structure maps the company **organization chart**.

These entries can be branches of the tree (with sub levels):

- Companies
- Countries
- Departments
- Cities

They can also be leaves (end-points):

- Persons
- Rooms
- Groups

Each entry contains fields (for example 93 fields per person). The administrator selects among the fields which ones to display in the user interface. Field names can be customized.

These fields can be telephone information, updated in real time by the OmniPCX Enterprise, OpenTouch, as well as administrative information, such as geographical location, department, photo, and employee number.

To simplify the task of the Administrator, each person's entry can be automatically created and then updated, from the OmniPCX Enterprise / OpenTouch users information.

Several internal phone numbers (Alcatel-Lucent 8/9 series, DECT set, modem, etc.) and several external numbers (DDI/DID number, mobile phone, fax, etc.) can be associated to the same entry. These numbers are updated in real time in the OmniVista 8770 company directory.

The fields in the organization (e.g., Company, Country, Department) can be automatically filled in with the information from the organization tree.

There are 3 ways to access the Directory:

- **Web directory:** users can access or update the company directory through their browsers. This interface provides the "click to call" feature.
- **Directory lookup:** users can access the phone numbers of the directory entries when performing a search by name from a MyIC Phone / Desktop/Mobile or OTC client.
- **Directory administration:** administrators manage the directory (and other authorized applications) through the OmniVista 8770 Directory Administration, via the Java-client or a browser.

To meet the challenge of multiple users with the same name (homonymy), the directory entry is created with an identifier made up of three fields:

- Name
- First name
- Free construction rule, may be left blank or contain additional information:
  - Extension number (internal OmniPCX number)
  - OmniPCX number
  - Cost Center

If a homonymy issue is found, the system launches an OmniVista 8770 alarm. If a user has several phones (DECT, FAX), the administrator can manually associate these phones to the same directory entry.

1.3.1 Web directory

Depending on their access profile, users can access and update the company directory via the Intranet, through their browser.

From the Home page of the web interface, the user can select between Directory Access and Network Management.

The use of the keyboard instead of the mouse for the main feature (search, call, etc.), the "quick search" and simplified navigation provide enhanced performance for intensive use (attendants, assistants, etc.).

The bookmark feature provides direct accesses to a hierarchical level in the favorite list.

Web directory customization

The OmniVista 8770 Directory web pages can be fully customized for easy integration into the company's intranet: logo, background, fonts, fields and filters, names of the fields, number of lines in one page, maximum number of answers for a search, etc.

Administrators can customize the interface with up to four themes: Classic, Azur, Silver, Custom. These themes define a set of graphical properties used for graphical display ("skins").

Users can choose between these four themes, and when they are logged, customize the way the results are displayed, the search filters, the detailed view, etc.

Automatic dialing from the web directory: "click to call"

A CTI (Computer Telephony Integration) feature is included in the OmniVista 8770 company directory. The "Click to Call" feature allows an OmniPCX Enterprise user, when clicking on a phone number (internal or external) in an entry or in a list, to automatically dial the number on the associated phone set.

There is no need for specific equipment or link, apart from an OmniVista 8770 directory and a telephone connected to the OmniPCX Enterprise. Because of the "STAP" protocol embedded in OmniPCX Enterprise, the OmniVista 8770 directory controls the OmniPCX call handling, instructing which number to call.

Note 1: For analog and DECT phones, the user must manually pick up. The click to call feature does not work with SIP phones. Click to call is available from the OmniVista 8770 web client, not directory administration.

Prefix management

The "Click to Call" feature automatically adds the carrier's prefix for an outgoing call.

For a multi-national company, or for a heterogeneous numbering plan, prefix management provides tables where all the prefixes related to the location of the caller/called persons are managed.

Linked fields

The OmniVista 8770 Directory provides an overall picture of the enterprise's organization. There are links between the entries: clicking on the fields "Assistant" or "Manager" triggers the pop up of the assistant/manager's entry. An entry may also be linked to another one via the "see also" field.

When the assistant or the manager cannot answer, the caller may ask the attendant to be put through to someone in the same department. OmniVista 8770 provides two icons allowing quick access to the list of people having the same assistant or manager.

Print-out of selected entries

You want to print the result of the selection you have made in the web directory?

You want to regularly send a portion of the company directory to your department?

From the web directory, by clicking on the icon "printer", OmniVista 8770 prints out the selected entries in a spreadsheet.

Personal address book

The Personal address book provides management of personal entries (persons: team members, customers, relatives, etc.) to authenticated users. These entries cannot be seen by other users - the Administrator cannot view their content, only the list of people using address books.

The Personal address books benefit from all the advanced features of the OmniVista 8770 company directory:

- Click to call: to directly call a telephone number by clicking on it
- Links with the other entries – "see also", "Assistant", "Manager"
- Capacity to create a person, a group, a room, etc.

The Personal address book is not an option; it is provided with the Directory license. There is no limit in the number of entries that can be created, but the entries in the Personal address books cannot exceed the global limit of 200,000 entries.

Note 2: The web directory search limit default is 250 items (limit can be changed). When results exceed the search limit, a warning is displayed to the user asking the user to refine the search. Photos or images associated with users are only displayed on the detailed view for an entry. These images are also reduced in size and quality to limit the bandwidth consumption and the time for search results to appear.

1.3.2 Directory administration

This interface allows the user to easily manage the directory, through a client or web client.

There are three or four folders in the OmniVista 8770 directory:

- The **company directory** reproduces the organization of the Company (hierarchical, geographical, financial, etc.), and contains the entries of the people and the groups, organized in the directory tree in companies, countries, departments, etc. Users access the Company Directory via a browser.
- The **address book** is the list of persons who use this feature (but the content of the address books is not displayed).

Before trying to synchronize the OmniVista 8770 company directory entries with an external LDAP directory, an audit of the actual directory is required.

The audit will define:

- The directory structure organization tree
- The directory schema: Type of entry, mapping of field between the two directories, selection of uniqueness attribute
- The responsibility for data update: In most cases, the external directory provides administrative data (location, organization, etc.) whereas OmniVista 8770 Directory provides the actual phone number inherited from the OmniPCX
- The deletion rules: For instance, an entry can be tagged with a validity date (which if crossed can initiate deletion of the entry)

When the system directory is synchronized (manually or automatically) with each network OmniPCX, OpenTouch each object is automatically updated.

Links between the two directories allow an automatic or manual update of the company directory entries with the system directory objects and vice versa.

The synchronized fields in the company directory are the telephone numbers – internal phone number, ISDN number, the cost center, the entity, and the first and last names.

Automatic creation of people in the company directory from the OmniPCX Enterprise users and aliases can be enabled or disabled.

While managing the OmniVista 8770 directory, direct access to the user configuration, alarms or accounting is available for authenticated administrators.

The system directory provides a directory of the networks, subnetworks, nodes, users, and information on OmniPCX Enterprise hardware, OpenTouch hardware, and OmniPCX software, OpenTouch software (version, IP address, etc.).

OmniVista 8770 includes additional fields for the system directory to enhance it and store administrative information for third party applications such as asset management:

- Five miscellaneous fields can be filled in by the directory administrator in the OmniPCX, OpenTouch nodes and in the OmniPCX Enterprise, OpenTouch racks, boards and phones. The names of these fields can be customized, for example "inventory number" or "contract number".
- Customer data (name, address, town, country) are automatically filled in from the OmniPCX Enterprise configuration, if they have been filled in, to view the localization of the nodes.
- Localization fields can be filled in by the directory administrator in the networks, subnetworks, nodes, OmniPCX Enterprise, OpenTouch racks and phones, to show where a device is located.
- A serial number field has been added for the OmniPCX Enterprise, OpenTouch boards and phones. It is automatically filled in for Alcatel-Lucent 8 series phone sets.

Automatic update with external directories

The synchronization between different directories lowers the TCO (Total Cost of Ownership) by avoiding duplicate entry of the data, double checks, and redundancies.

The OmniVista 8770 LDAP company directory simplifies the administrator's task because of its automatic synchronization with telephone data from the OmniPCX Enterprise, OpenTouch network, and automatic updating of any part of the directory tree using other LDAP directories. Automatic import/export of LDIF (LDAP Directory Interchange File Format) files is used in this case.

There are many different types of directories within enterprises: e-mail directories, Excel files, proprietary directories and relational databases. The LDAP protocol is a standard, yet many existing directories are not fully LDAP V3 compliant, or need updating. LDAP V3 compliant directories with a different structure must also be adapted: a free mapping tool is delivered with OmniVista 8770 to help our Business Partners carry out this synchronization.

An audit of the directories to synchronize is highly recommended to find out whether these directories are LDAP V3 compliant, which fields will be exported to update the OmniVista 8770 directory, and which fields of the OmniVista 8770 directory are of use in the existing directory. Other information, as e.g., is the names of the fields the same or not, is the organization of the directories the same or not, etc is also provided.

Audit and mapping services for directory synchronization are available in the Alcatel-Lucent Professional Services catalogue.

Example of Alcatel-Lucent Professional Services OUT-of the-BOX solution: Microsoft Active Directory – Alcatel-Lucent OmniVista 8770 directory synchronization.

1.3.3 Directory security

Confidentiality of directory entries

There are 3 levels of confidentiality on directory entries:

- Green entries can be viewed by anyone with access to the directory (default value)
- Orange entries can be viewed by users with the orange access level
- Red entries are the most confidential ones (e.g., entry of the company's CEO is a red entry which can only be viewed by authorized people)

The personal fields can only be viewed or modified by users having the total view or modification right. The personal fields are:

- Home phone
- Home postal address
- Employee number

For example, a user can only view your home telephone number if the user has total view rights to your entry.

The administrator chooses which fields are displayed or not displayed in the web directory. He can also change the name of the fields according to the organization of the company.

Directory application access rights

Predefined users profiles are created as group entries in the company directory.

These groups and persons are located in the directories Administration and Managers in the directory tree. Only the administrators can view the administration directory.

In addition, there are:

- The anonymous access (default), no need to be logged, which is the same as the partial view of the green list, without two fields that are masked: car license and cost center name.
- The personal access, which allows the same things as anonymous, plus the view and modification of all the fields of one's own entry, except the fields Employee number, and cost center name which cannot be modified.

A user can belong to several groups, adding rights.

In addition, there is also one predefined account concerning the directory application in the Management directory, Alcatel-Lucent 4059, which is the common account for the attendants using an Alcatel-Lucent 4059 Multimedia Attendant Console with the rights Total modification company.

This is a summary of the access levels to the OmniVista 8770 1.3 applications depending on the user profiles: The Security application allows the management of the access levels, login, passwords, etc.

There are also 4 predefined user profiles for the directory application:

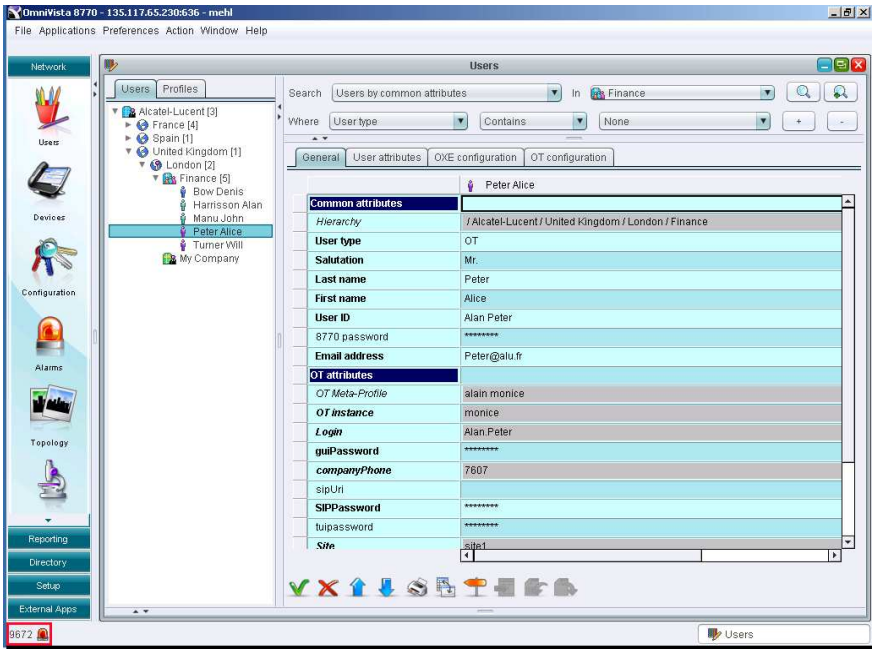
- Total modification Company Directory
- Partial modification Company Directory
- Total view red list
- Partial view orange list

1.4 Unified User Management

The OmniVista 8770 NMS Unified User Management module allows administrators to provision OmniPCX Enterprise, ICS and OpenTouch users, associate their SIP devices and activate services through one unified interface with a reduced set of parameters. This user application provides the configuration of users from one single interface. Company directory, OmniPCX Enterprise, ICS and OpenTouch are automatically updated with the user data configured in the Users application.

The application provides functionalities like:

- Select profiles to apply to sets of users
- Define Meta profiles for user creation
- Associate devices to users
- Create and associate in one step new devices to users
- Mass provisioning through txt/csv import and export



1.4.1 Types of users

The Users application allows configuring three classes of users:

Company Directory users: Users not related to an OmniPCX Enterprise or OpenTouch. They are identified by their name, not associated to a device. They are just associated to an entry in the company directory.

OmniPCX Enterprise users: They are identified by their name and directory number. They are associated to a device declared in OmniPCX Enterprise. The device can be an analog, digital, IP or SIP phone set. If configured, they can have access to OpenTouch applications from a mobile set (Remote extension) or an OmniTouch 8600 MIC Desktop (MyIC PC SIP).

OpenTouch users: They are identified by their name and directory number. They are associated to a device declared in OpenTouch. The device can be SIP phone set, OmniTouch 8600 MIC Desktop (MyIC PC SIP), an OmniTouch 8600 MIC Mobile set, an OpenTouch Conversation application on tablet, a LifeSize video device and a mobile device. They have access to OpenTouch applications.

The type of user is identified by a color symbol for easy recognition.

1.4.2 Multiple operations

The search area is available when the users and profiles tabs are selected and the tree structure is expanded to the level of a specific entry. By selecting any object in the main window and using multiple filtering criteria, it is possible to access the user profile and perform multiple actions like modify, associate devices and delete.

You can search a user by common, OpenTouch and OmniPCX attribute. The various search attributes are:

- User type
- Salutations
- Last Name
- First Name
- Email address
- Meta profile
- MSAD User ID
- Person Deleted in MSAD

Filtering criteria can be set on each attribute. When they are activated, the application displays a list in table format.

There is also option to add extra filters for more refine searches.

Device association can also be done after the user is selected. There is an option to search an existing device and associate it. The device can also be created from scratch and associated to the user. Various types of devices can be associated to the users:

- VHE8082: My IC Phone 8082
- MYICPCSIP: My IC PC SIP
- NS4008: IP Touch 4008 in SIP mode
- ST2022: Thomson device
- ST2030: Thomson device
- NS4018: IP Touch 4018 in SIP mode
- My IC Phone 8082 video
- My IC Phone 8002/8012

1.4.3 Batch User creation by MetaProfile

To save time, a group of users can be created using profiles. It facilitates the creation of groups of users and enables the application of rules to these users.

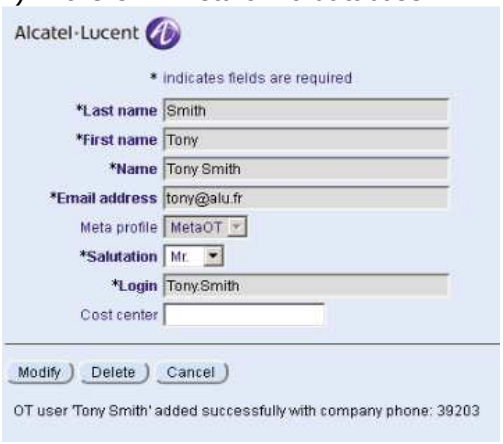
Meta profiles simplify user creation: they avoid having to tediously enter parameters one by one for each new user. It facilitates creation of an OmniPCX Enterprise or OpenTouch user with only one attribute and automatic attribution of a free number.

1.4.4 Import and Export of User Data

The user data can also be exported/imported on the OmniVista 8770 server. The supported file formats are CSV and TXT. If the suffix of the import file is ".txt", the field delimiter is TAB ("\t"), otherwise the field delimiter is the comma (",").This file can be used for mass provisioning.
There is a feature for exporting a template of user data.

1.4.5 Integration with Microsoft™ Active Directory

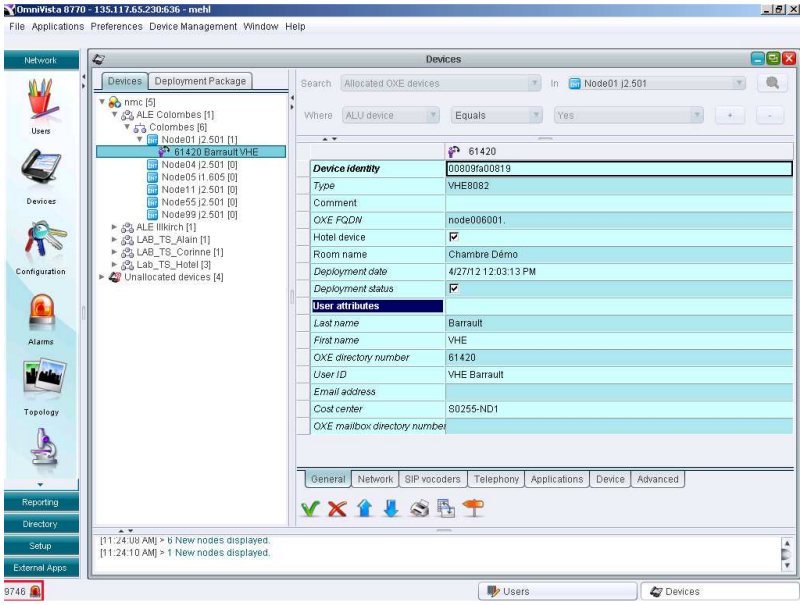
OmniPCX Enterprise and OpenTouch users can be configured from the Active Directory using an OmniVista 8770 user management web tool launched from the Active Directory Users and Computers application. This web tool allows selecting an Active Directory user, before configuring this user (creation, modification, deletion) in the OmniVista 8770 database.



Synchronization with directory:
There is an automatic entry in the directory of the user created through Active directory. The user is created with the attributes like first name, last name, AD unique ID and e mail ID. There is an automatic update of telephone numbers of these users. If there is a user in active directory and OmniVista 8770 with the same last name and first name automatic synchronization of information takes place.

1.5 Device Management

The Device management application is the interface for the configuration and deployment of the SIP and mobile devices handled by OmniPCX Enterprise and OpenTouch nodes. Addressed devices can be SIP physical phone sets, OmniTouch 8600 MIC Desktop applications (MyIC PC SIP), OmniTouch 8600 MIC Mobile sets, OpenTouch Conversation applications on tablet, LifeSize video devices or Any mobile devices. It provides devices with all configuration parameters and firmware for their commissioning. Up to 5 different types of business devices can be associated per user.



With the Devices application, you can:

- Create device types.
- Configure devices (creation, update and deletion).
- Associate one or several devices to an OpenTouch or OmniPCX Enterprise user.
- Display SIP devices IP-address.
- Make configuration data accessible to devices (for their commissioning).
- Make software versions accessible to devices (deployment packages).
- Import/export device data to or from a file (CSV format).
- Verify firmware and application information.

1.5.1 Device Association and dissociation

The devices can be associated to the users in few steps. There is option to associate an existing device or Create and associate a new device to a user in one step.
A device can be:

- A physical SIP phone set identified by its MAC address
- An OmniTouch 8600 MIC Desktop (MyIC PC SIP) identified by its SIP URI
- An OmniTouch 8600 MIC Mobile identified by its IMEI (International Mobile Equipment Identity)
- An OpenTouch Conversation application on tablet identified by its directory number
- A LifeSize video device identified by its directory number
- Any mobile device identified by its IMEI (International Mobile Equipment Identity)
- MyIC Phone 8082 R260 video Peer to Peer
- My IC Phone 8002/8012

The associated devices can also be dissociated from the user. There is also a list of devices which are de-allocated.

1.5.2 Deployment Packages

It provides the list of available packages per communication server. A deployment package is defined for each type of device for which firmware or application deployment is necessary and performed by OmniVista 8770. The package includes the firmware, and applications for My IC Phone 8082.

For devices handled by the OmniPCX Enterprise, once deployed, a package is available on the OmniVista 8770 server. Devices download this package when they connect to the network and initialize.
For devices handled by the Open Touch, once deployed, a package is available on the OmniVista 8770 server and copied to the OpenTouch server. Devices download this package when they connect to the OpenTouch server and initialize.

1.5.3 Import and Export of device data

This procedure facilitates import of a file including device data, to configure multiple devices in one single operation (mass provisioning). The supported file formats are CSV and TXT. If the suffix of the import file is ".txt", the field delimiter is TAB ("\t"), otherwise the field delimiter is the comma (","). There is feature of exporting a template of device. The aim of this procedure is to build a template file containing configuration data, from a device. From this template CSV file, a device can be created in one step. In additional there is also feature to export device data to a file. This feature enables to export information of several devices to a text file.

1.6 Configuration application

The configuration module provides centralized management of the OmniPCX Enterprise and OpenTouch. It has been designed to be flexible, user-friendly, and easily integrated into a legacy environment. The OmniVista 8770 configuration provides local or remote management of a single Alcatel-Lucent OmniPCX and OpenTouch or network (i.e., multiple nodes of the OmniPCX Enterprise and OpenTouch).

The network manager can quickly and easily edit, create or delete any network object in the managed network.

A configuration tree and a configuration table allow to quick view, navigate, and select one or several instances. A search function helps the network manager locate any object or field. In addition to the OmniPCX and OpenTouch search, the OmniVista 8770 enhances the search capability because it offers searches for an attribute name or value within the grid result.

In the configuration tree, there are nodes (OmniPCX Enterprise, OmniPCX Office ,OpenTouch), sub-networks (groups of nodes), and networks (groups of sub-networks).

While using the configuration application, the network manager can access and modify the data in the alarms and directory applications by clicking on the corresponding tab.

1.6.1 Systems inventory

The system inventory reproduces the topology of the OmniPCX and OpenTouch networks, and includes the networks, sub-networks, nodes, and within each node the content of each OmniPCX Enterprise (ACT, media gateways, boards, trunk groups, telephone devices), OpenTouch (configuration, servers, users and mailboxes), ICS and OmniPCX Office systems. It is a technical tool to manage the installed base. Its content can be exported in LDIF for third party applications such as asset management.

This inventory is synchronized each night by OmniVista 8770 and saved in its LDAP database.

1.6.2 OmniPCX Enterprise and OpenTouch configuration

Configuration application principales

The database configuration is embedded on each OmniPCX Enterprise and OpenTouch. The information is retrieved through an object model or datamodel. This object model standardizes the OmniPCX Enterprise and OpenTouch data description but does not directly affect the OmniVista 8770 configuration. The OmniVista 8770 configuration application manages only the information presentation and the same ergonomic can be applied whatever the object managed. The advantages of this architecture are:

- The Configuration application is independent of the OmniPCX Enterprise and OpenTouch software releases
- Automatic synchronization with the OmniPCX Enterprise and OpenTouch software releases
- The application can configure several OmniPCX Enterprise and OpenTouch in a unique session.

The OmniPCX Enterprise and OpenTouch are configured online to ensure consistency and relevance of the data. It allows any combination of central and local management while accessing a continuously updated database. The same interface is used for any object or data to be managed.

The application can configure several OmniPCX Enterprise in a single session, provided they use the same software release. The "scoping" feature allows filtering and updating the same object within a set of OmniPCX Enterprise. For example, an emergency call number on the top-right programmable key of all the telephones within the OXE network can be created at once.

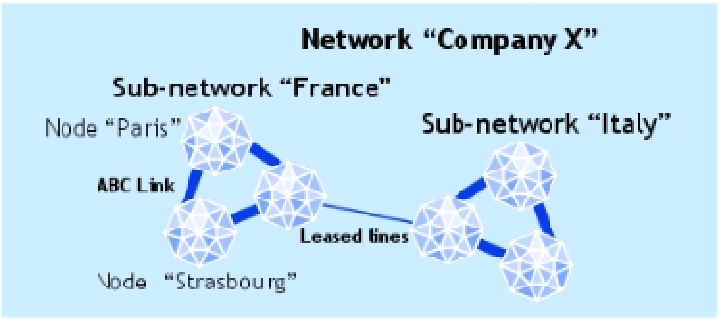
The OmniPCX Enterprise and OpenTouch configuration application is an online configuration. This means that for configuration operations, the OmniVista 8770 is connected to the related OmniPCX Enterprise and OpenTouch. Configuration commands can be scheduled through import/export. This allows the advance preparation of commands to be applied later to the network. It also makes it possible to import or export data directly from any application using a standard text file format.

Glossary of the managed objects

For OmniPCX Enterprise nodes:

A **sub-network** is a group of nodes linked together (each node has a different number). The numbering plan is homogeneous in a sub-network, meaning that the phone number of each set is unique.

A **network** is a group of sub-networks, linked by trunk groups. The numbering plan can be heterogeneous, meaning that the phone number of a set can be different depending on the calling OmniPCX Enterprise.



An **instance** is one item inside the Alcatel-Lucent OmniPCX Enterprise: a set, an abbreviated/speed dialing number: phone number 65444 for example.

An **attribute** is a parameter related to an instance that can have different values. For example, the attribute Cost Center ID of the instance phone 65444 has the value 255.

An object (or a class) includes all the instances of this type: users, abbreviated/speed dialing numbering, etc.

Single operations

The single operations available on manageable objects are:

- Create (with default value)
- Create from (with the same value as another instance)
- Modify
- Delete
- Action (for some instances, launches an action, for example "move")

For each attribute, online help is displayed dynamically.

1.6.3 Import/export mechanisms

General principles

The configuration application displays OmniPCX and OpenTouch data in a tree and grid presentation. This allows the administrator to perform the export and import actions indicated below. Export actions: The administrator can:

- Export one branch of the tree (such as all users, all classes of service, or other category)
- Search for objects and export the grid result

Whether single or multiple operation modes are used, the result can be (manually) exported to a standard ASCII file and reused with standard Windows applications (such as Excel).

This allows, for example:

- Exporting OmniPCX Enterprise or OpenTouch data to a company database
- Producing a system directory
- Defining user profiles that can be reused

Node	Directory N°	Dir. name	Dir. First Name	Shelf Address	Board Address	Set Type
Mozart	65791	LAVIGNE	JEAN	1	11	4034
Mozart	65796	BRUNET	GEORGES	0	23	4034
Mozart	65808	DUBAIN	INES	0	24	4035T
Mozart	65810	FALTE	ARTHUR	1	11	4035T
Mozart	65812	BENKCUN	MOHAMMED	1	9	4034
Mozart	65813	ELHAGI	JAOUDAT	0	9	4035T
Mozart	65815	PICART	GUSTAVE	0	23	4034
Mozart	65820	RACHET	VIVIANNE	0	4	ANALOG
Mozart	65832	GERARD	ROBERT	255	255	4037 (4035 & TSC IP)
Mozart	65834	CARRE	CAROLE	255	255	4035T
Mozart	65852	LAVILLE	DOMINIQUE	1	9	4034
Mozart	65861	LEMEUNIER	SERGE	0	10	4035T
Mozart	65863	FRANCOIS	RAYMONDE	255	255	4037 (4035 & TSC IP)
Mozart	65871	VIERKBIN	REMI	255	255	4037 (4035 & TSC IP)

A standard ASCII file containing configuration data can be imported into the OmniVista 8770 application, for an update of the OmniPCX Enterprise or OpenTouch. This allows the offline preparation of a batch of changes, without being connected to the OmniPCX Enterprise or OpenTouch.

Import/export of several objects

Several objects of the same family can be exported to the same file. For example, a user profile can be defined that includes the user set configuration, the keyboard and the directory.

Import

When an imported file is applied to the OmniPCX Enterprise or OpenTouch for configuration changes, the following rules are used:

- If the data already exists in the OmniPCX Enterprise or OpenTouch, it is a change
- If the data does not exist, it is a creation
- You cannot delete the data using import

It is also possible to clearly specify in the imported file, for each item, which operation must be done (e.g., create, modify, create or modify, delete).

Export

Export has the same rules as import.

Import/export allow the administrator to prepare in advance a set of changes, save the changes to a file without applying it to the OmniPCX Enterprise, OpenTouch, and re-import the file at the right time for OmniPCX Enterprise or OpenTouch changes.

1.6.4 Configuration security management

Three predefined access levels can be assigned to the OmniVista 8770 configuration users: No access, Normal, All (see Security chapter).

In addition, there are two specific security aspects linked to the OmniPCX Enterprise configuration:

- Large companies with several network managers, multi-company, or organizations with a security/confidentiality policy need additional access rights for configuration. The access profiles and the configuration by domain provide a comprehensive solution for OmniPCX Enterprise networks. Each OmniVista 8770 user is assigned an access level for the configuration determining which data and nodes the user holds management rights.
- Operations logging provides an audit of the configuration operations that have been conducted within the OmniPCX Enterprise network: object creation, deletion, modification of an attribute, etc. Statistics can be made with filters on the type of event, for example.

Access profiles

In the OmniVista 8770 configuration, it is possible to create/modify levels in the OmniPCX Enterprise to limit the access for one OmniPCX Enterprise down to its attributes.

There are ten access profiles, common to all the OmniPCX Enterprise nodes.

A profile defines an access level (nothing, read, read/write, all) for each OmniPCX Enterprise object.

Associating a profile to a user allows limiting the configuration scope for non-expert users. It may prevent troubles due to wrong settings in critical parts of the system.

The users with the simplified management access profile can only manage users, hunting groups and speed dialing, with a reduced set of attributes. Through this profile, a non expert can perform simple and common configuration operations, allowing expertise optimization. This profile can be tailored to the customer's needs (managed objects, attributes, etc.).

Configuration by domain

The activation of secure access on an OmniPCX Enterprise and OpenTouch node provides specific access right on this node to a list of users. It allows giving access to specific nodes only to specific users, in charge of these nodes.

In addition, configuration by domain provides specific access rights on a domain on each node. Domains are defined in each OmniPCX Enterprise and OpenTouch node, and secure access to each node must be configured.

On each OXE Domain, a user can have for each object, instance or attribute: No access, Read only, Read/Modify, Read/Modify/Create/Delete.

Administrators have the highest access rights and manage security (access rights).

Up to 255 OXE domains (instead of 32) can be created within a sub-network.

A domain related to an OmniPCX Enterprise homogeneous sub-network consists of a set of:

- Users and/or data terminals
- Hunt groups (the sets of a hunt group must belong to the same domain)
- Phonebook entries

These domains are only related to configuration, and have no link with the other OmniVista 8770 applications.

1.7 Audit application

This application provides centralization and follow-up of the recorded operations performed in the OmniPCX Enterprise network. The operations are recorded whatever the way to perform them: through OmniVista 8770 Configuration, through Telnet/Manager, eConfig, etc. This is an option of the Configuration module.

The OmniPCX database contains information about:

- Communication Server CPU, version, site and contact information
- Media Gateway type and localization
- Board localization within the Media gateway and Serial Number
- Telephone devices by site for UA/analog lines or IP address and serial number

Note: the serial number has to be filled manually if the device is not an IP Touch

The OmniVista 8770 synchronizes all the information items, stores them inside its LDAP database, and displays them in the Configuration application. The data can then be used by the other OmniVista 8770 application. The data can also be consulted by an LDAP client or in the configuration application without having to connect to the Alcatel-Lucent OmniPCX. The field labels can be customized if required by the administrator.

The Alcatel-Lucent OmniPCX inventory stored in the LDAP database has six additional data fields. The administrator can change the names of these additional fields according to company needs. The additional data fields are: • Misc1 • Misc2 • Misc3 • Misc4 • Misc5 • Site Address.

The Audit application is embedded in the Configuration module. It enhances OmniPCX Enterprise security:

- In case of security threat, specific analysis provides information on the operations performed during a time range
- For **Service Level Agreement**, e-mail distribution of monthly reports provides the list of the operations made for this customer or department by the administrators in charge
- The Audit application is a supervision tool used to record and manage:
- MAO object configurations (also named Operations) performed on an OmniPCX Enterprise and OpenTouch. OmniVista 8770 provides centralization and follow-up of the recorded operations performed in the OmniPCX Enterprise network. The configuration operations are recorded whatever tool is used to perform them:
  - OmniVista 8770
  - Telnet/Manager
  - eConfig, etc.
- System operations performed on an OmniPCX Enterprise. It provides the history of the Telnet sessions opened and the detail of the commands entered

- Login/logout operations on OmniVista 8770 clients
- Accesses to the OmniVista 8770 client applications, such as Accounting and Reports

Audit Grid and Tree Structure

Summary of all the operations and detail of an operation are displayed in the audit grid. Filters per node, on a time range, on an object, on the user id (if security access activated on OmniPCX Enterprise), on an action, etc. are available for display and edition.

The OmniPCX Enterprise nodes are displayed in a tree by sub-networks and networks; right-click launches directly the node configuration.

Statistics on Audit Information

The statistics on Operations audit provide a follow-up of the configuration actions performed in the OmniPCX Enterprises. These statistics are available with the Audit option (no accounting or performance licenses are needed). Filters can be applied on a sub-network, a node, an object, a user id, on the action performed, and other criteria.

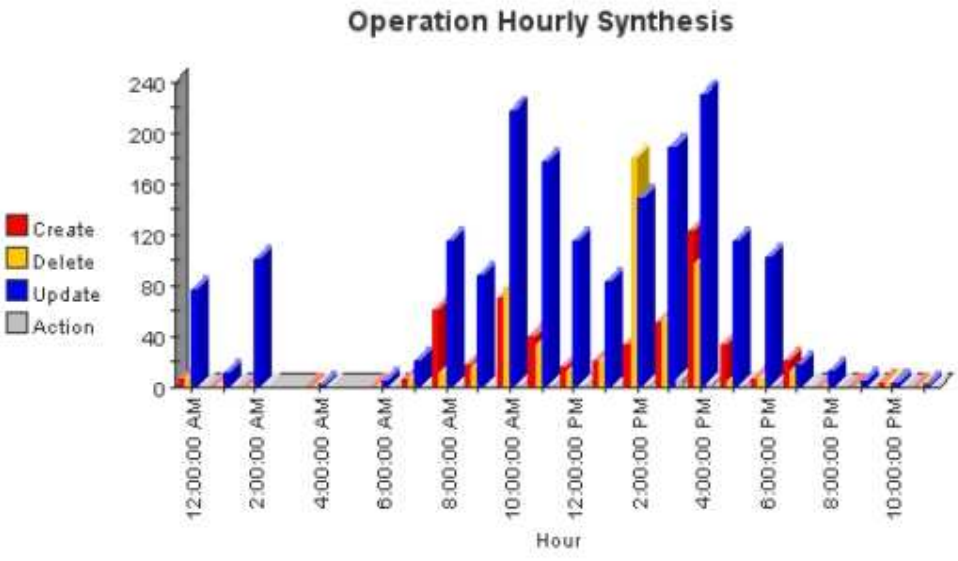
- Operations audit

  There are three predefined reports delivered with the OmniVista 8770 available in the Reporter, in the Audit folder:

  - **Total reports**: Operations hourly and daily synthesis, provides counters by operation types (Create, Delete, Update, Action)
  - **Detailed report**: each operation is detailed (date/hour, action performed, object name, server name, user name, etc.)

  In addition, administrators can create their own audit reports by modifying existing ones or creating them from scratch.

  Example of operation hourly synthesis:



Information about logs

The OmniPCX Enterprise generates its log file automatically (without any management required). However, log retrieval from the OmniVista 8770 requires activating the audit process globally and for each OmniPCX. The audit graphical application and the audit report provide predefined filters to access specific logs. In addition, the console access to the Alcatel-Lucent OmniPCX provides

advanced maintenance commands for debugging purposes such as traces of a process or traces specific to one component.

Using the OmniVista 8770 Audit application, the administrator can check any change that was made on the OmniPCX Enterprise configuration. The grid view presents a summary of all the modifications:

- Server or tool used to perform the change; the server could be:
  - An OmniVista 8770 server
  - An application such as Instant Communication Server
  - The manager application embedded in OmniPCX Enterprise
- Login of the user who performs the changes
- Date of the modification
- Action: add, update, delete
- Type of object modified: subscriber, programmable key
- Another Alcatel-Lucent OmniPCX broadcasting its internal changes

From the grid, the administrator can display the detail view with the new applied values.

Syslog files

With the security-by-default mechanism, the SYSLOG file is enabled on the Communication Server and registers all network events as part of the process for preventing security issues. A record of every event that involves the kernel, the network interface, the login, and other components seen by the Linux system is distributed. These records are categorized by origin and severity and stored in files (directory: /var/log (ex: messages, secure, auth.log, etc.).

The SYSLOG file keeps records or logs that concern:

- Connections (who connected, and at what time)
- The Kernel and registration of the daemons used on devices
- Unauthorized attempts to enter the system
- History of system commands used

Log files are dynamic and can vary widely in resource utilization. To avoid congestion on the disk caused by these files, an automatic mechanism rotates the log files. They are compressed and renamed by this mechanism.

The rotational schedule is weekly and/or when the file exceeds 500 Kb (before compression). In concept, SYSLOG is a straightforward tool used to send small textual messages (usually less than 1024 bytes) to a logging server via UDP and/or TCP. In the most common configurations, SYSLOG messages are sent across a network in an unencrypted clear text form, but options do exist to use SSL/TLS services to transport SYSLOG messages in encrypted form.

1.8 Launching external applications

External applications (exe file or browser) can be launched in a separate window from the client. Access to these applications is controlled by the OmniVista 8770 security agent.

1.9 Maintenance

The Maintenance application provides:

- Immediate or scheduled backup for one or for a set of OmniPCX and OpenTouch.
- Immediate or scheduled software update for one or for a set of OmniPCX.

– Tools for the OmniVista 8770 server: Immediate or scheduled database backup, defragmentation, reboot are provided in the 8770 maintenance.

A minimum bandwidth between the OmniVista 8770 server and the remote systems is necessary for network maintenance operations.

1.9.1 OpenTouch suite backup

In the case of a major upgrade, or in the case of a problem with the OmniPCX and OpenTouch, this feature provides the immediate or scheduled backup of the configuration, and the restoration with the latest backed up version. Restoration is manual.

The scheduled save of a set of OmniPCX and OpenTouch, of a network or a subnetwork is also available (for example, for a Remote Service Center).

During the backup, the telephony system functions normally. Management operations (MACs) are blocked during this period to avoid inconsistencies in the database.

1.9.2 OmniPCX software update

The OmniVista 8770 Software Update feature allows the network manager to update OmniPCX (versions and patches) and personnel can avoid traveling between sites.

In local operations, an installer, performs software administration locally. The Software Update feature can perform remote updates. By using OmniVista 8770, the update activity and reporting is centralized.

This feature provides the immediate or scheduled software update for:

– One or more OmniPCX of a network or a subnetwork (for example, for a Remote Service Center).
– one or more OmniPCX Enterprise PCS (Passive Communication Server)

The OmniPCX licenses are updated independently.

The OmniPCX Enterprise maintains two different versions, on the active partition and on the inactive partition. The Software update process on the OmniPCX Enterprise is:

1. The software version is loaded on a temporary partition
2. The inactive partition is updated from the temporary partition
3. The inactive partition database is populated with the new data
4. The OmniPCX switches to the updated partition (which now becomes the active partition)
5. If a problem occurs, the OmniPCX will switch back automatically to the old partition.

The update is performed in four steps:

– Copy the new OmniPCX version to the local OmniVista 8770 server drive
– Schedule the update operation on OmniVista 8770 (using the maintenance application)
– OmniVista 8770 sends the version update to a master CPU via (s)FTP

The master CPU applies the software update to a client CPU. Several master CPUs can be used at the same time. The master CPU can update several client CPUs at the same time. If the number of CPUs involved in the software update exceeds the simultaneous limit (eight CPUs), the remaining CPUs will be handled as soon as the update operation is completed on a CPU.

The administrator can check the update status from the maintenance application.

OmniVista 8770 keeps a record of last IPT software update status with date, success, failure and detailed logs of the CPU updated.

1.10 Alarms application

The Alarms application centralizes the alarms and events coming from OmniPCX and OpenTouch, as well as the internal faults detected on the OmniVista 8770 server, and the Performance threshold crossing, when this module is activated.

- The alarms may result from a call, an environment, an equipment problem, or a processing failure. If the Performance option is activated, problems in the OmniPCX Enterprise and OpenTouch quality of service are also consolidated.
- The events can be the creation, the deletion, modification of an object such as a user or an extension, a change in the value of an attribute, or a security breach. The events are available for OmniPCX. Relevant events are handled by the OmniVista 8770 server to update its inventory and its internal application, but all OmniPCX Enterprise configuration changes are handled by the audit application (Cf Chapter 1.4.3 Audit).

These alarms and events are displayed in real time according to filters and are processed by the alarms application according to the needs of the telecom manager. The alarms are displayed following the ISO model, using specific colors related to the severity level.

By default 1,000 alarms and events are displayed, and the 5,000 most recent alarms and events are stored in the OmniVista 8770 database. Filters and details allow the network manager to look for specific items in the list.

The administrators can manage the alarms: delete an alarm, clear it or acknowledge it.

Alarms and events lists and details can be printed, in order for the network manager to archive historical data.

Statistics on alarms are also available in the report application.

When an alarm occurs, a sound can be played, an automated e-mail can be sent, or a script can be processed, thus providing pro-active management.

By right clicking on the alarm or the event, the user directly launches the configuration of the corresponding object.

The alarms and events automatic deletion can be set-up (by default: 45 days and 10,000 alarms and/or events).

The combination of the OmniVista 8770 topology and the alarm application empowers the network manager to reduce troubleshooting time and be more proactive.

1.10.1 Alarms and events trees

The network manager can view all the alarms and events stored by the server, or only part of them.

There is one alarm tree and one event tree, dynamically updated.

Alarm tree

The Alarm tree enables the network managers to select the alarms from the network, a sub-network, a system.

Next to each item of the tree, a colored dot shows the maximum severity of the alarms associated to this item.

In addition, for OmniPCX Enterprise, the alarms can be listed by Passive Communication Servers (PCS), links between 2 nodes, segments of the links, shelves, boards and terminals.

For OpenTouch, the alarms are listed by software components in each physical server.

If the Performance option is activated, the performance alarms threshold crossing are also displayed (Cf 1-14 Performance chapter).

The internal alarms sent by OmniVista 8770 applications are also displayed in the alarms tree with the capacity to select the alarms of an application or a module.

It is an intuitive way to find out quickly what has gone wrong.

Event tree

The OmniPCX Enterprise events tree is built the same way, but the selectable objects are any object in the network, sub-network and OmniPCX such as users, phone book, abbreviated/speed dialing numbers, phone services, data services, numbering plan.

1.10.2 Alarms and events lists

Alarms and events lists corresponding to the item selected in the tree are displayed on the right of the screen. By default, all the alarms and events are shown.

By clicking on the icon "Detail", the details for a specific alarm or event selected in the list is displayed, providing more information and an initial diagnosis (for the alarms).

Alarms list

Each alarm is displayed in an alarm window and described according to the standard OSI format.

The network manager can acknowledge, clear or delete a selected alarm, or ask for details.

The description of each alarm contains:

- An identification number
- The severity level (6 levels)

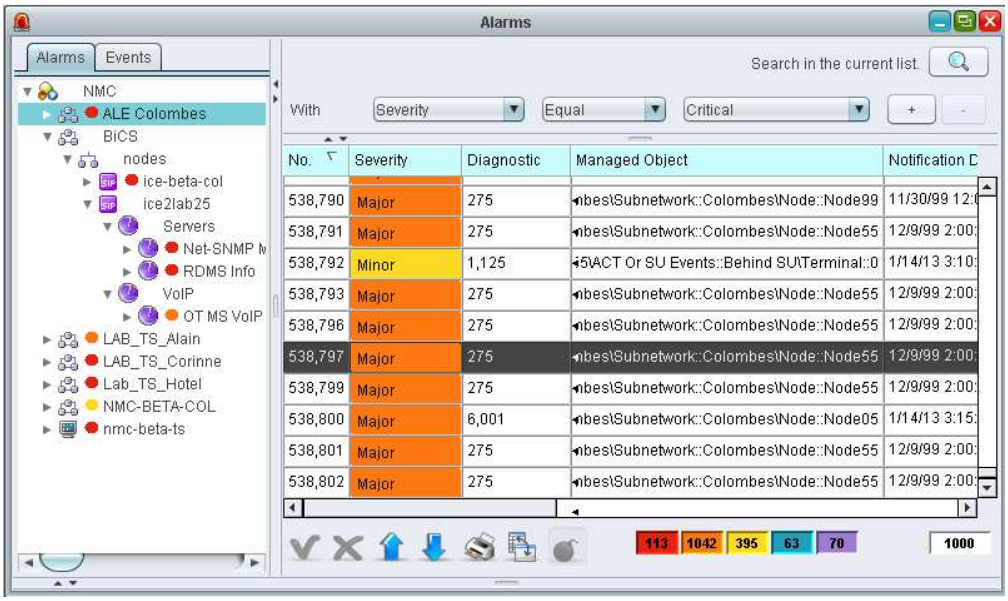
  OmniVista 8770 follows network industry practices and presents standard severity definitions and naming. The alarm levels and alarm names cannot be modified.
- The managed object
- The notification time
- Additional information
- The event type
- The probable cause

In addition, the detail of an alarm displays:

- The time of the alarm and the notification time of the alarm
- A notification ID
- Information, which is a fault diagnosis identifier
- Fault diagnosis
- Signature
- Action
- Remarks (free field)

The signature, action and remarks provide the identification of agent in charge and the action performed on the alarms.

Alarms list example:



In the alarm window, a color is attributed to each alarm according to the severity.

Five severity levels are possible:

1. Critical RED
2. Major ORANGE
3. Minor YELLOW
4. Warning **BLUE**
5. Indeterminate PURPLE

Clear (related to a former alarm that has been corrected) WHITE

The total number of alarms/level is indicated at the bottom of the list, for the item selected in the tree.

The maximum number of alarms stored can be configured by the manager. (Default = 1,000 alarms). The oldest alarms are automatically overwritten.

Events List

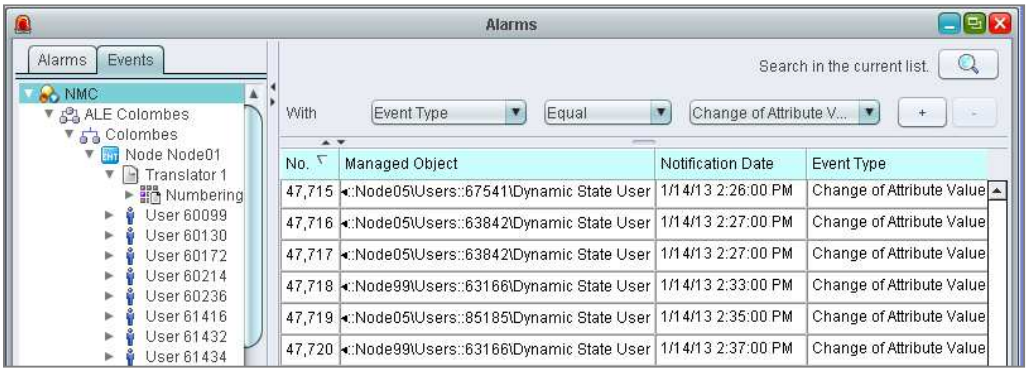
The events list has the same user interface as the alarms list, but it contains fewer items:

- Identification number
- Managed object
- Notification time
- Event type

In addition, the detail of an event displays:

- The reception time of the event
- A notification ID
- Information: name of the machine from where the event originates

Events list example:

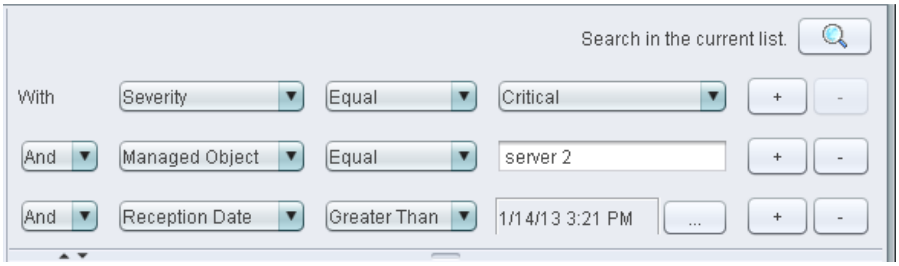


1.10.3 Alarms and events filtering and sorting

Filtering can be set on alarms and events in the lists: only selected alarms/events are displayed.

Filtering criteria can apply to any field within the alarms or events lists (notification time, managed object, etc.). Several criteria can be specified simultaneously (multi criteria search).

Example:

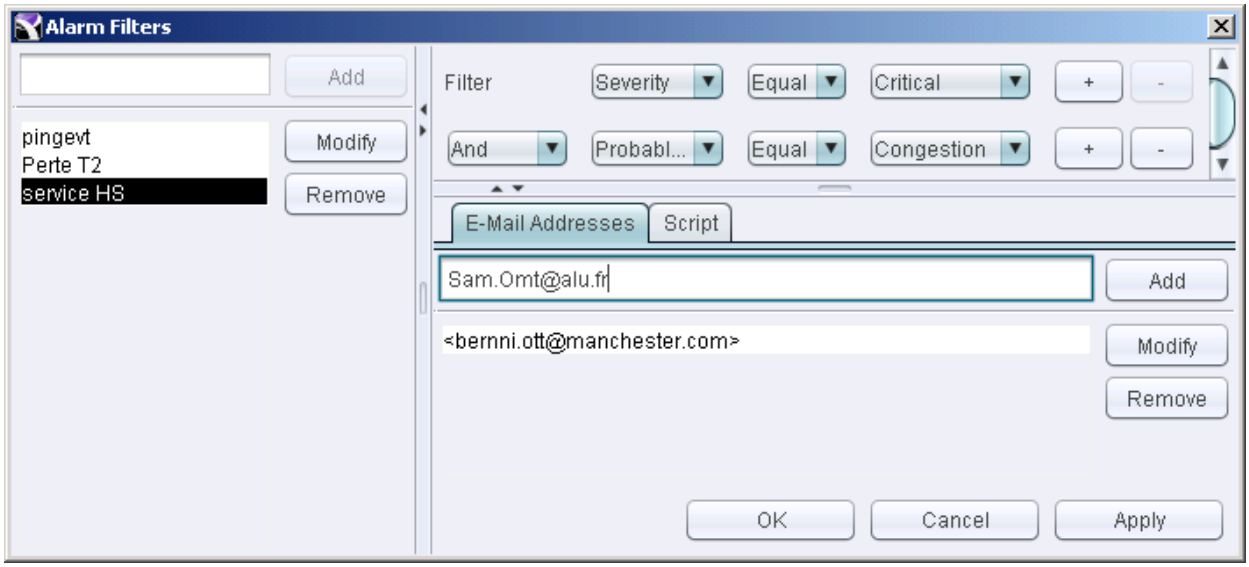


The content of the alarm window can be sorted on any field of the List: date, object, type, etc.

1.10.4 Notification of alarms

The user can set up profiles to launch an action, such as sending an e-mail or activating a script, performing a specific action on the reception of selected alarms.

In the example below, the alarms application sends an e-mail to Sam Omt when there are critical alarms due to congestion in the network:



1.10.5 Statistics on alarms and events

From the alarm grid, the administrator can print or export an alarm report.

In addition, the report application provides predefined reports on alarm management (statistic, resolution time, action taken). These reports can then be exported in various file formats (including txt, html, pdf, xls).

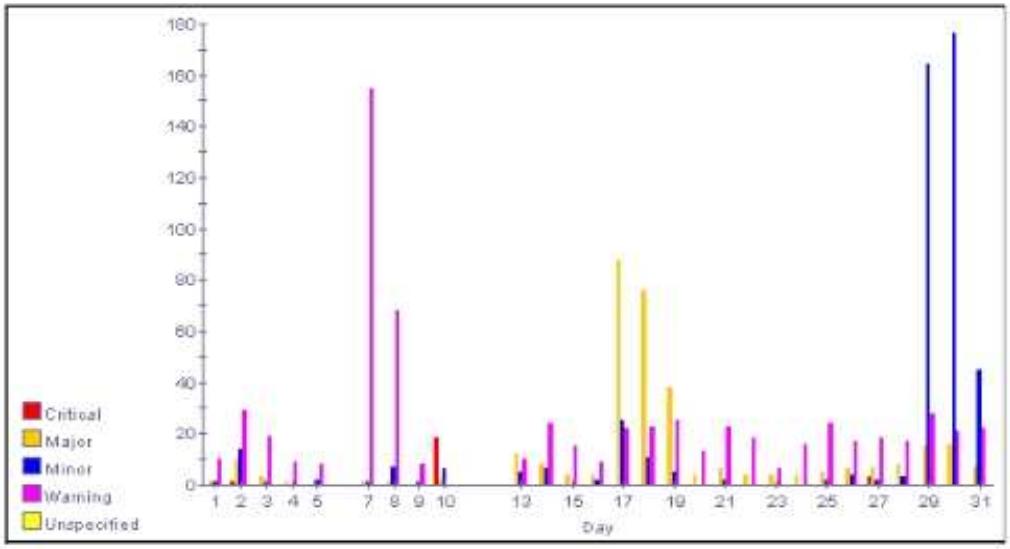
The statistics on alarms and events provide a follow-up of the alarms and the events in the network. These statistics are available with the alarm license (no accounting or performance licenses are needed). Filters can be applied on a sub-network, a node, a board, on the severity of the alarms, and other criteria.

There are four global and three detailed predefined reports delivered with the OmniVista 8770:

Global reports:

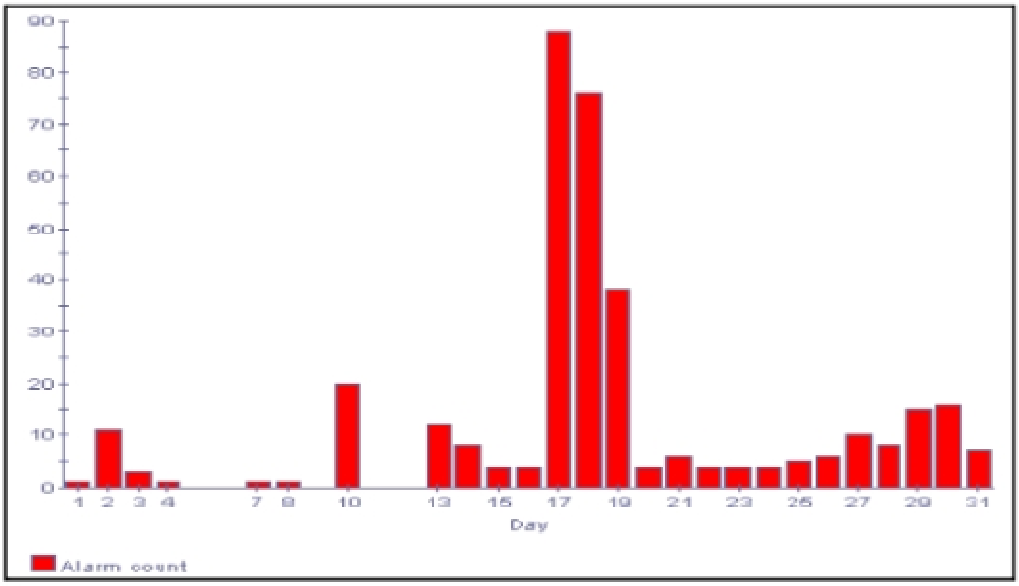
– Daily follow-up of the alarms by severity, for one month: This report displays a synthesis of the alarms which occurred within the network during a period – previous month by default. The alarms are displayed for each day of the month, by severity: critical, major, minor, warning, unspecified, totals. This report allows a follow-up of the alarms month-by-month, a view of peaks of alarms during a day in the month, and what the severity of these alarms was.

Example of Histogram:



– Daily follow-up of the alarms for one level of severity: This is the same report as above, with a filter applied to one level of severity.

Example of histogram, with a filter applied to the critical and major alarms only:



– Daily follow-up of the events by type of event
– Resolution time of the alarms: If an external company or department performs network maintenance, this report provides a way to analyze the quality of this service by editing statistics about the average resolution time of the alarms that occurred in the network. An alarm is "cleared" when the administrator has cleared it in the alarm window. In addition, administrators can create their own reports on alarms and events by modifying existing ones or creating them from scratch.

Detailed reports:

8770, OmniPCX and OpenTouch detailed reports provides the list of Alarms for the selected system and period, including Performance Alarms if activated.

8770 alarm detailed report Friday, January 18, 2013

Filter: Notification time is Last Month

8770 server name : nmc-beta-col

Notification time	Severity	8770 service name	Service details	Probable cause	Incident type
12/5/12 1:45:12 AM	Critical	Alarm Server	Alarm Server	46	Quality of service
12/5/12 1:47:24 AM	Major	LDAP Server	Plug-in::Integrity	46	Quality of service
12/5/12 1:47:24 AM	Major	LDAP Server	Plug-in::Integrity	46	Quality of service
12/5/12 1:51:48 AM	Major	LDAP Server	Plug-in::Integrity	46	Quality of service
12/5/12 1:51:48 AM	Major	LDAP Server	Plug-in::Integrity	46	Quality of service
12/5/12 1:51:49 AM	Major	LDAP Server	Plug-in::Integrity	46	Quality of service
12/5/12 1:52:05 AM	Minor	Accounting	Module::Cost Calculation	7	Processing error
12/6/12 1:45:12 AM	Critical	Alarm Server	Alarm Server	46	Quality of service
12/6/12 1:46:40 AM	Major	LDAP Server	Plug-in::Integrity	46	Quality of service
12/6/12 1:46:40 AM	Major	LDAP Server	Plug-in::Integrity	46	Quality of service
12/6/12 1:50:16 AM	Major	LDAP Server	Plug-in::Integrity	46	Quality of service
12/6/12 1:50:16 AM	Major	LDAP Server	Plug-in::Integrity	46	Quality of service
12/6/12 1:50:17 AM	Major	LDAP Server	Plug-in::Integrity	46	Quality of service
12/6/12 1:50:39 AM	Minor	Accounting	Module::Cost Calculation	7	Processing error
12/7/12 1:45:05 AM	Critical	Alarm Server	Alarm Server	46	Quality of service
12/7/12 1:46:37 AM	Major	LDAP Server	Plug-in::Integrity	46	Quality of service

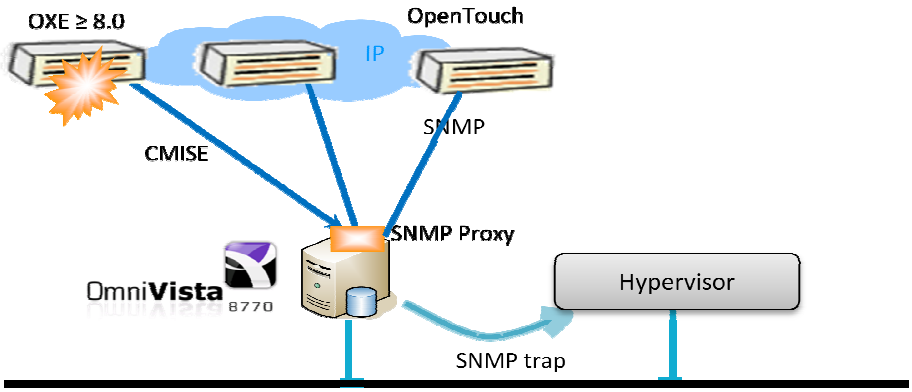
1/12

1.10.6 Connection

For the OmniPCX Enterprise ABC network, the alarms coming from all the nodes can be centralized on the main node and sent to the OmniVista 8770.

1.10.7 SNMP Proxy

The SNMPproxy agent is integrated and runs on the OmniVista 8770 server. The SNMPproxy agent allows the supervision of OmniPCX systems, OpenTouch and OmniVista 8770 components by an external hypervisor.



All the incidents sent by PBXs or OmniVista 8770 components, are converted into SNMP V2c traps by the SNMP proxy agent and transmitted to the hypervisor according to the configuration of incident filters.

The SNMP proxy agent can also provide the status of each PBX and OmniVista 8770 it monitors, and indicate any change relating to a PBX such as, for example: new PBX monitored, PBX removed, PBX name modified, PBX network (or subnetwork) modified, or incident status change.

1.10.8 Security

There are 2 access levels to the alarms and events application:

- The Read level allows access to the alarm list and details, no change is allowed
- The All level allows access to everything in the alarms and events application

1.11 Topology

The Topology maps display a logical view of the networks, sub-networks, nodes (OmniPCX Enterprise, Office and OpenTouch) and the OmniVista 8770 application as well as the logical links between OmniPCX Enterprise.

They are updated in real time with the alarms, using severity colors. Only correlated alarms (alarms having a beginning and an end) are used to update the topology.

Performance alarms are consolidated if the Performance module is activated.

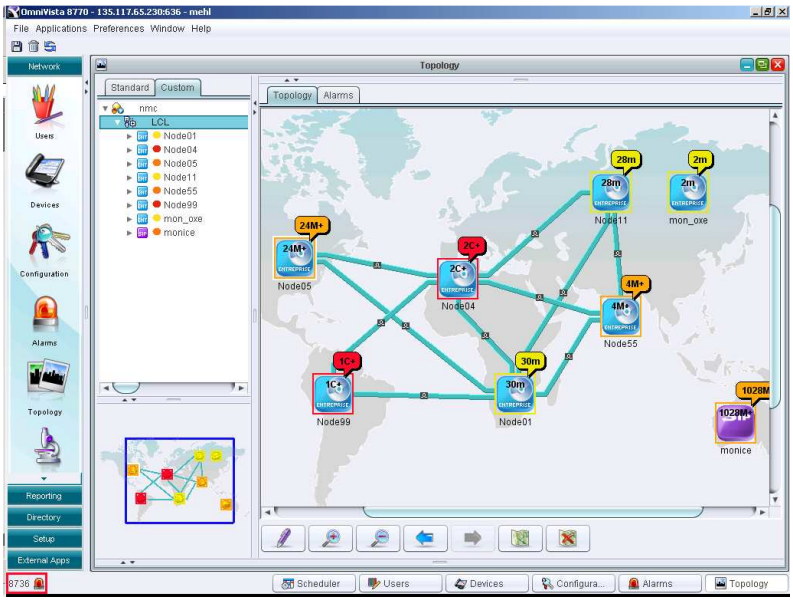
The topology application is an option in alarms.

Enhanced mechanisms have been implemented such as auto-discovery of the ABC links between platforms, and automatic display of the sub-networks and nodes existing in the configuration.

If a problem occurs, the manager clicks on the object and accesses the faulty item. It provides everything from an overall view to a close-up display of the faulty board. Thus, the network manager has a global view of the network updated in real time and can drill down on a node, a component, etc.

If a parameter needs to be changed, the telecom manager right-clicks on the object to launch the configuration of this object, or to go to the corresponding alarms. Telnet can also be started for direct access to OmniPCX Enterprise and OpenTouch embedded maintenance tools.

The topology maps can be customized to display geographical aspects or a domain. The network manager can customize the background maps, and create his own topology views by selecting the networks, sub-networks, nodes, among the existing one or by creating new objects.



1.11.1 Topology tree

The network manager can view the whole network, or only a section of it.

In the topology tree, the network manager can select a view in the network, a sub-network or a specified node.

The OmniVista 8770 application is displayed, and it is possible to focus in on the different applications and modules, such as Alarms, Topology, Scheduler, etc.

Next to each item in the tree, a color indicates the maximum severity of the alarms linked to the item.

1.11.2 Topology maps

Multiple map levels allow the network manager to navigate from one view to a sub-level view by double-clicking on the object. For instance, to view the different nodes of a network, the network manager double-clicks on the icon representing the network.

All the nodes are automatically displayed with their links, calculating their respective place so that the views cannot be in the same place.

Moreover, the network manager can customize the maps by changing the position of the objects or adding a customized background, for example, a map of the area. This configuration can be saved.

The alarm notification with the number of alarms and their severity level are associated with each object of the map. This allows the network manager to see, at a glance, the status of the nodes and the internal links of the networks and sub-networks, and the OmniVista 8770 applications and modules themselves.

A graphical display of the OmniPCX Enterprise and OpenTouch architecture displays the system hardware components or servers.

To see the alarms linked to the displayed object, or start its configuration, the network manager needs to right-click on the object.

For example:

The network manager detects in the topology tree that there is at least one major alarm (orange color "1M+") in an OmniPCX Enterprise node. The manager double-clicks on the icon (or navigates in the tree), to know more.

The architecture is displayed with the media gateway. By clicking on it, the manager can immediately look inside the rack of the faulty media gateway: the DECT boards have one major alarm each.

With a single click on the alarm, the manager can read the alarm details: the problem occurred the 8th of April, the diagnosis is: "Loss of a coupler. Any transmission with the coupler has become impossible ..." One of the recommendations is to reinitialize the coupler.

Another click on Configuration and the configuration of the coupler opens, so that the administrator can reinitialize it.

1.11.3 Customization

The full customization of topology provides custom views, from a geographical point of view (customized background maps, creation of links, areas, network elements, etc.), to a technical point of view (creation of icons for specific sets, systems, etc.).

Alarms retargeting provides the animation of an object with existing OmniPCX and OpenTouch alarms. Script launching allows starting an application when clicking on an object in the topology.

OmniVista 8770 brings features which are used by large network administrators like alarms retargeting to update any created items with existing OmniPCX and OpenTouch alarms or script launching to start a program when clicking on an item in the topology.

Topology toolbar (edit mode): The user can create custom views, network elements, links, labels, polygonal backgrounds, etc.

For example, this feature makes it possible to represent the links to the operators and the private links (except internodes ABC links which are automatically created) and to "re-target" the alarms from the OmniPCX and OpenTouch so that alarms appear automatically on these links.

An icon "voice mail" can also be created, with the alarms associated to this application, so when there is an alarm concerning voice mail, the icon becomes red, orange, yellow, etc. depending on the severity level.

User actions can be configured so that they can be launched directly from the icon on the topology map, for example, launching the configuration of a system or opening a file with information on the location of the node.

In OmniVista 8770, a consistency check icon has been added to the task bar. This icon launches a consistency check between the topology and the system directory.

In the preferences of the Topology application, it is possible to choose to display or not display the VPN and/or ABC links between the OmniPCX Enterprise, to enhance the quality of the views when there are numerous links.

The network manager can also choose to display or not the OmniVista 8770 server in the customized view, and to display or not the standard or customized view to enhance the performance of the application.

1.11.4 Security

There are 2 access levels to the Topology application:

- The Read level allows access to the Topology views, no change is allowed
- The All level allows access to everything in the Topology application

1.12 Accounting

Decreasing telecommunication costs and providing better service to customers are constant concerns of any company. This is just as true for telephone usage as for any other expense; telephone costs must be controlled and efficiency measured. OmniVista 8770 offers all companies operating on one or several sites, a way to analyze their telecommunication costs as well as the quality of their telephone service.

OmniVista 8770 automatically retrieves charging information from all of a company's sites equipped with OmniPCX Enterprise, OmniPCX Office and OpenTouch, whether networked or not. Telephone costs can be consolidated by means of comprehensive reports.

OmniVista 8770 is equipped with a relational database in which information can be searched, sorted, analyzed, presented and exported according to selected criteria. This database contains the organizational map, the report definitions, the CDRs (Call Detail Records), the performance counters, the carriers' code book and the alarms and events. The database can be saved and restored.

Costs can be controlled in a multi-operator environment. Simulation features let you make the best choice.

Detailed and summary reports as well as hit lists are available. Most typical reports are predefined and pre-installed to ease the task of the accountant manager. They can be automatically and periodically generated, exported and sent by e-mail. Many different formats are available, such as Excel, PDF, txt and HTML.

This powerful and secure tool communicates with OmniPCXs and OpenTouch using standard protocols, enabling large amounts of information to be processed quickly: maximum number of CDRs

handled per day is 500,000. The maximum number of CDRs stored in the database is 30 million. Any number of CDRs beyond this amount must be archived.

The use of passwords and partial concealment of dialed numbers ensures confidentiality.

Call monitoring provides supervision of Telecom expenses and can automatically send an e-mail when those expenses exceed a threshold.

The main parts of the OmniVista 8770 accounting administration are:

- **Organization map**: the organization map is a tree displaying the financial organization of the company. Costs are dispatched and reports are generated along the cost centers and the organizational levels of the tree. Historical information remains, so that the Administrator can see the changes that occurred within the organization of the company. The accounting tree represents the past and present accounting organization of the company.
- **Accounting management** allows the administrators to manage the carriers' fees, to apply specific costs, to ensure confidentiality. Advanced features such as operators' comparison and simulation provide reports on what would have been the telephone costs with another carrier, on selected directions. In OmniVista 8770, different carriers' fees can be set up by trunk groups.
- **Monitoring (tracking)**: The option Tracking/Monitoring provides a graphical view called "Tracking status" and a notification by e-mail or alarms in case of threshold crossing. In addition, the accounting application provides predefined or customized reports on Monitoring, or threshold crossing, using cumulative counters.
- **Reporter tool**: The main function of the accounting application is to produce reports on telecommunication costs, according to the parameters provided in accounting management and to the information provided by the OmniPCX in the CDRs generated after each call. Using the Reporter, the user can generate predefined or customized accounting reports. The Reporter is also used to manage reports on Performance and Alarms.

1.12.1 Organization map

This graphical view of the financial organization includes local levels, cost centers, people, users, data terminals, etc. It makes it easy to find an object within the company.

This organizational tree is automatically updated from the OmniPCXs and OpenTouch regarding cost centers, phone sets, attendants, trunks groups, etc.

The organization map can also be updated from the company directory* regarding people, or customized by the network manager, with no limit in the number of hierarchical levels.

Once there is a change in the organization, such as a cost center, the existing entry is kept as an inactive entry and a new entry is created. The new entry becomes the current active entry. Statistics are provided concerning the active and inactive entries.

The organization map can be printed.

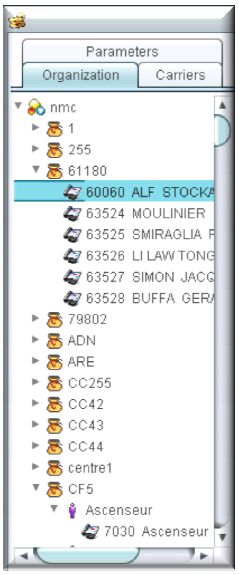
* Company directory not available for OmniPCX Office

All the objects of the organization map are shown in a table format (levels and extensions):

Number of items in the organization			
Type	**Active**	**Inactive**	**Total**
Users	3716	92	3808
Attendant	48	0	48
Attendant Group	10	0	10
Station Group	96	0	96
Voice Mail	47	0	47
Data Terminal	21	0	21
Project	7	0	7
Trunk Group	82	0	82
Link	42	0	42
Undefined Entity	0	9689	9689
Global Entity	0	10	10
eRMA	2	0	2
Total	4071	9791	13862

Number of items in the organization			
Type	**Active**	**Inactive**	**Total**
Meta company	1	0	1
Undefined	0	1	1
Level	0	0	0
Cost center	200	1	201
Directory entry	262	24	286
Global Accounting	0	1	1
Total	463	28	491

Example of organization map:



Updating the organization map

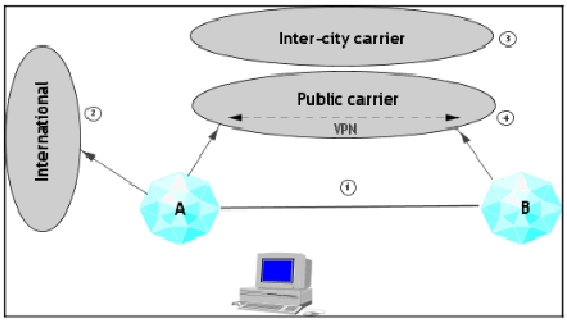
Changes occur in the company organization: moves, new task forces, acquisitions, etc. In the OmniVista 8770 configuration, the network manager and any authorized users can create, modify, and delete cost centers, sets, abbreviated/speed dialing numbers, etc. The accounting organization tree will be updated automatically.

A history of the organization map is maintained to assign costs to the right objects. If the user name of the extension changed on January 1, the reports generated today from last year will still indicate the former name, and the reports on this year will bear the current name.

The network manager can define a retrospective validity date.

1.12.2 Networking and multi-carrier services

The following illustration presents the different networking services provided by OmniPCX Enterprise:



1. Private link with ARS features (including forced on net, breakout, etc.)
2. Access to a carrier through dedicated links (direct access)
3. Access to a carrier through the public network (indirect access)
4. Access to a Virtual Private Network (ISVPN, ABC/VPN)

1.12.3 Accounting domains management

The CDRs are stored in the OmniVista 8770 accounting database with the Call Type information. Each ticket is allocated to an entry within the Organization (users). With this entry information, the administrator can generate filtered reports based on the Call Type or Organization information. OmniVista 8770 predefined reports include one report based on user groups and Department information.

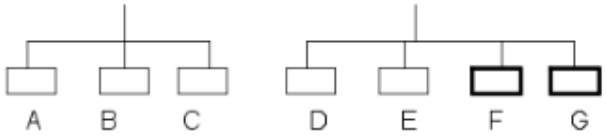
The accounting domains management provides separate billing for each company or entity. These companies can share the same PBX, or be distributed over several sites.

In the organization map, different branches are created, corresponding to the different companies or departments to manage. The accounting manager creates domains, including one or more branches.

An access level is assigned to each user of the accounting application, corresponding to a domain. It means that the user has access to a limited section of the organization map:

In the example below, the domain management can be defined as follows:

- User X is limited to Company A
- User Y is limited to Company B
- User Z is limited to departments F and G



The information contained in the reports generated by User Y affects only Company B.

Depending on their access level, the User can create, modify, delete reports and report definitions, but in the generated reports, only information from the user's domain will appear.

Domains are created manually; there is no limit in the number of accounting domains.

The administrator of the accounting system can see the whole Organization map with all the companies, managed on a single server. Administrators can create, delete, and modify all the reports definitions and reports for all the companies. They can create customized report definitions for a company.

They can also automatically generate and periodically send by e-mail the reports to the company's accounting users.

1.12.4 Multi-time zones accounting

OmniVista 8770 supports the OmniPCX Enterprise multi-time zones features.

For accounting, Multi-Time zones provides cost calculation according to the local time zones, for a better control over telecom costs.

An additional field in the CDR (GMT difference between system and trunk time) allows billing calculation according to trunk local time.

This cost calculation is applied for external calls only, not applied in Performance and VoIP Performance.

1.12.5 Cumulative counters and archive/restore

The CDR ticket is always built in the caller node (trunk, the caller). Whatever the status (conversation, ringing, transfer), an incoming or outgoing CDR is generated when one of the parties (external or internal) hangs up. Several type of CDR can be provided for OmniPCX Enterprise:

- Public or private outgoing (through trunk) file
- Public or private incoming (through trunk)
- Internal call (call between users in the same node)
- Internal network call (call through ABC network between users different nodes)
- Transit (call through transit node)

The ticket can include information to detect a forwarded or transferred call. Call attempts that fail (no ringing due to trunk congestion or invalid number) do not generate a call record. Call records for internal calls are generated only when there is a conversation.

At the end of each call, a call detail record (ticket) is created within the OmniPCX Enterprise memory. Every hour, the call records in memory for that period are flushed (moved) into a ticket file. Each day, the OmniVista 8770 commands the OmniPCX to immediately flush any call records that remain in the OmniPCX into a file. The OmniVista 8770 then retrieves all the new accounting files.

*Example: **CDR data volume***

The transmitted payload for call records for a typical day can be calculated as follows:

- *The size of a call detail record is fixed at 0.5 kb*
- *In this example there are 1000 users who generate approximately 10 call records per day.*

The amount of accounting data to exchange will be: N° calls x No. of PCX Users x 0.5 kb.

For an OmniPCX with 1,000 users, 5Mb or less will be transferred each day.

For large networks, the amount of accounting data to be managed can become quite large in a short period of time. For example, on average, 20,000 users generate 200,000 CDRs a day (each user making five outgoing calls and receiving five calls), which means four million CDRs a month, 48 million CDRs a year, etc.

Managing so many CDRs may have some impact on system performance: which amount of time does it take to generate a report on a 12 months period with 20,000 users?

And what about database saturation, with 48 million CDRs plus the reports stored in it?

To prevent a decrease in performance and database saturation, two different strategies have been implemented in the OmniVista 8770, which increase performance for large networks and/or high traffic.

The first strategy is to extract the most important information from the CDRs, and to store only this significant information in order to save space. For accounting, the most important information is the

cost, the duration, the number of calls for each object in the organization map: people, cost center, departments, trunks, etc. Cumulative counters are automatically created, to store this important information and access it quickly.

However, what about the CDRs containing the detailed information on each call? If they remain on the hard disk, no space is saved. If they are deleted, what about the detailed information that may be useful (e.g., in case of a claim)?

The second strategy, which is supplemental to the cumulative counters, is to automatically archive the oldest CDRs to keep only the most recent information (e.g., three last months). As soon as the CDRs are safely stored on an external device, they can be deleted from the local disk. A past period can be restored by time range for claims and access to more detailed information. New reports can be generated on these CDRs.

These two features are included in OmniVista 8770 accounting, for faster report generation for total reports, for a long period, and to store information for several years, for medium and large networks. Archiving the oldest CDRs frees space on the system disk, resulting in better performance, while detailed reports can still be generated by restoring information from the archived CDRs.

Cumulative counters

Cumulative counters are automatically calculated by the OmniVista 8770 after CDRs are loaded. There are counters on duration, costs and number of calls, day-by-day, month-by-month and year-by-year, for each object in the organization map: sets, trunks, cost centers, carriers, directions, etc.

Cumulative counters are used in predefined reports to allow quick generation of reports over long periods (e.g., 12 months), while deleting CDRs.

See the list of predefined reports based on cumulative counters in the section Predefined report definitions.

Customized reports may also be generated using cumulative counters information; in this example, a Wizard helps to generate a customized total report for each project daily:

CDRs' Archive/Restore

Archiving may be automatic or manual when selecting a period of time.

Archiving begins automatically after one month of CDR loading.

The CDRs can be stored on a selected disk which can be local or external; files are sorted by node and by date. Archived files are restored manually.

CDR storage

The maximum number of tickets handled per day is 500.000 with a maximum of 30 Million tickets in the OmniVista 8770 database. By default, the call detail records are kept in the OmniVista 8770 database for three months. This parameter can be changed in respect to the maximum number of tickets supported by the MySQL database (30 Million). Every night, the call detail records are aggregated into the counters (Days, Months, Year). Call record files older than one month are

archived. Archived call detail record files older than three months are deleted from the disk; this period can be modified.

1.12.6 Subscriptions

The administrator can create customized reports including fixed costs: Carriers fixed costs, costs depending on the type of set, the use of voice mail, DDI/DID and automatically generate, export them, e-mail them, etc.

The reports can include fixed costs and telephone costs. These costs can be daily, weekly or monthly costs.

Example 1: With this feature, the administrator can create reports including the carriers' fixed costs (e.g., monthly subscriptions) and call costs.

Example 2: For leased sets or offices, the administrator can generate a billing report including the invoiced cost (carrier's call cost + additional fees if required) plus cost of the leased set (depending on the type of set), additional cost for the voice mail usage, the DDI/DID, etc.

Subscriptions allow cost assignment, even if the user's set was not used during a particular period; it means that a subscription report can be generated (and exported, e-mailed) even if no CDRs were generated during the period.

The OmniVista 8770 automatically manages the assignment of telephone equipment fixed costs. There is no need for the administrator to know which type of set the user has, or if the set has been changed, or if the user has a voice mail or not, or a DDI/DID. Due to the automatic synchronization between the OmniVista 8770 and OmniPCX Enterprise, as soon as there is a change (e.g., the assignment of a mailbox or an Alcatel-Lucent IP Touch 4068 Phone instead of a DECT), OmniVista 8770 recognizes it and automatically changes the cost from then on. This feature is only available for OmniPCX Enterprise.

Subscriptions allow telephone cost assignment, with no increase in the TCO.

To assign costs easily, the administrator creates cost profiles (like invoiced costs) that are stored and applied to various objects of the organization map: sets, costs centers, departments, companies, trunks, etc.

Example 3: "Students profiles A", from 01/01/2004 to 12/31/2004, monthly costs:

- *For sets: for an analog phone = 0.74 Euro (approximately $0.99 USD), for a 4074 set (DECT) = 2.00 Euros (approximately $2.68), for an Alcatel-Lucent IP Touch 4038 Phone = 2.30 Euros (approximately $3.08)*
- *For voice mail (4035 type): 1.30 Euro (approximately $1.74)*
- *For DDI/DID: 2,00 Euro (approximately $2.68)*
- *Various (not automatically managed by OmniVista 8770): 100 Euros (approximately $134.01) for rooms of type A*

Subscription reports

In OmniVista 8770, there are six predefined subscription reports: annual synthesis, monthly synthesis, and monthly synthesis by cost center, detailed report by cost center, monthly subscription cost, and detailed invoice.

In addition, customized reports including fixed costs or fixed costs plus invoiced costs in the same report can be created. Example 1: Carrier monthly total report with subscriptions + call costs. Example 2: Weekly report "Costs by directory entry" including fixed costs plus invoiced costs.

1.12.7 Call monitoring (tracking)

Tracking status

Tracking status, also referred to as monitoring, is in the accounting/traffic module. It provides a display and a notification by e-mail or via an alarm when a threshold is exceeded.

The user can create profiles to set up thresholds for:

- Accounting: number, cost and call duration, or a variation of this data
- Traffic analysis for OmniPCX Enterprise : Duration of exceeding R1 threshold, rate of abandon on called numbers and on attendant groups

These thresholds can apply to different call types: Incoming, outgoing, outgoing private calls, DISA (direct incoming system access) calls and subscription.

When the cumulative counters exceed these thresholds for the period and the object, an e-mail is sent to one or more addresses, or an alarm is generated.

Example of a "Cost control" profile that can be applied to an item in the organization map (a set, a cost center, a department, a trunk, etc.): when the monthly telephone cost exceeds 10,000 Euros, or the daily cost exceeds 100 Euros, etc., an e-mail is sent to the user John Smith:

In the tracking status, only accounting information is displayed: the thresholds are displayed as red arrows.

Tracking (threshold) reports

Tracking reports help to control peaks of traffic and cost. Tracking status thresholds are used.

When the cumulative counters exceed these thresholds for the period and the object, monitoring reports show the value above this threshold.

Predefined tracking reports

There are three predefined tracking reports in OmniVista 8770:

- Phone monitoring: daily duration of the calls exceeding the threshold for a phone
- Group of attendants monitoring: abandoned call rate for OXE attendant groups
- Trunk group monitoring: traffic on trunks exceeding R1 threshold

Additional tracking reports can be created through customized reports.

1.12.8 Reports

The OmniVista 8770 Report application provides:

- Report templates (and the capability to customize report templates)
- Report generation with filter applied at the generation time
- A view of the generated report

Once generated, reports can be exported to several popular and useful formats.

- TXT: The exported report is a TEXT file with a table containing the raw data extracted from the database without Formulas or Charts.
- PDF: The exported report is a PDF file which can be viewed using any standard PDF viewer.

  The display of this PDF file matches exactly the display of the report viewer (without the vertical navigation tree).
- HTML: The exported report is an HTML file which can be viewed using any standard HTML browser.

The display of this HTML file matches the display of the report viewer. Graphical items, such as a pie chart, are saved separately as PNG files.

– XLS: The exported report is an Excel file which can be viewed using Microsoft Excel.

1.12.9 Predefined accounting report definitions

OmniVista 8770 comes with a set of ready to use accounting report definitions: total reports, cumulative reports, detailed reports, hit lists, traffic volume analysis, subscription, monitoring and DISA reports. These report definitions meet most needs: controlling and assigning costs, analyzing service quality, re-billing, telephone costs control panel, usage monitoring (e.g., international calls).

The following predefined report definitions are delivered with the application:

– Total and cumulative report definitions

Produces telephone costs reports and allows cost assignment within the organization, classified by:

– Directory entry (person, group, room) (1)
– Group of users belonging to the same Department in the Company Directory (1)
– Extension
– Cost center
– Level of the organization map (department, country, company, etc.)
– PIN (Private Identification Number) (1)
– Project code
– Direction (local, national, etc.)
– Comparison carrier
– Direct carrier
– Indirect carrier

Example of total report:

Tuesday, October 23, 2012

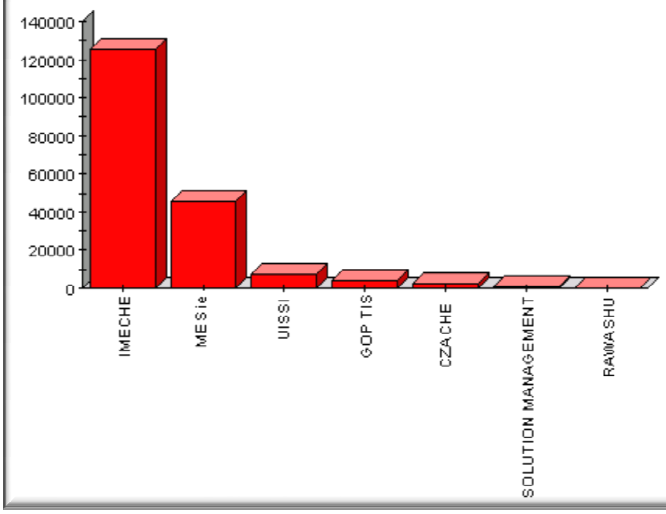
Cumulative reports

Daily Duration By Cost Center

Filter: Date is Last Month,
Cost Center containing S0163

Cost Center : S0163

Name	Extension	No. of Calls	Duration
IMECHE	67161	559	34:43:41
MESie	63341	197	12:46:55
UISSI	63450	20	01:57:53
GOP TIS	67637	3	01:01:30
CZACHE	60161	10	00:45:54
SOLUTION MANAGEMENT	67670	4	00:14:35
RAWASHU	67257	2	00:02:13



– Detailed report definitions

Provides information about each call for each:

- Directory entry (1)
- Group of users belonging to the same Department in the Company Directory
- Extension
- Extension with extended user name
- PIN (Private Identification Number)
- Project code

Example of detailed report:

Detailed Reports
Directory Entry

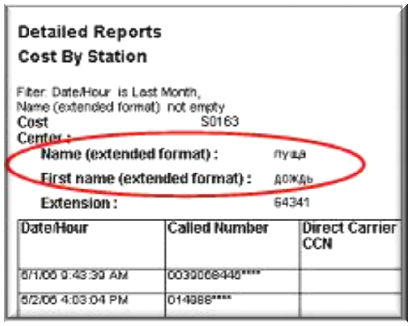
Friday, October 19, 2012

Filter: Date/Hour is Last Two Months
Name (Directory) :
Extension :

Date/Hour	Called Number	Direct Carrier CCN	Direct Carrier Dir. Type	Duration	Invoiced cost w/o tax
9/14/12 9:55:25 AM	6360*			42:41:21	0.00
9/14/12 9:55:25 AM	6360*			42:41:17	0.00
9/14/12 10:02:50 AM	6771*			42:33:56	0.00
9/14/12 10:02:50 AM	6771*			42:33:52	0.00
9/14/12 10:09:50 AM	6709*			42:26:56	0.00
9/14/12 10:09:50 AM	6709*			42:26:52	0.00
9/14/12 10:17:46 AM	6709*			42:19:00	0.00
9/14/12 10:17:46 AM	6709*			42:18:56	0.00
9/4/12 4:02:53 PM	6335*			15:30:04	0.00
9/4/12 4:02:53 PM	6335*			15:30:00	0.00
9/4/12 4:26:10 PM	6716*			15:10:05	0.00
9/4/12 4:26:10 PM	6716*			15:10:01	0.00
9/14/12 11:40:41 AM	6774*			09:10:37	0.00

1/5544

Example of detailed report with user name in extended format:



Detailed Reports
Cost By Station

Filter: Date/Hour is Last Month,
Name (extended format) not empty
Cost Center : S0163
Name (extended format) : пуща
First name (extended format) : дождь
Extension : 64341

Date/Hour	Called Number	Direct Carrier CCN
6/1/06 9:43:39 AM	0039068446****	
6/2/06 4:03:04 PM	014988****	

– Traffic analysis report definitions

Allows measurement of the traffic for both outgoing and incoming calls:

- Trunk group is the total duration and number of outgoing and incoming calls by trunk groups
- Abbreviated (speed dialing) numbers is the hit list of the most frequently called abbreviated numbers

Provides information about calls exceeding defined thresholds

- Duration threshold provides the detail of the call duration (called number, etc.), which exceeded the threshold, by set, for outgoing calls
- Cost threshold is the same report with a cost threshold
- Answered/Non answered calls per user groups (1)
- Incoming/Outgoing calls per user groups (1)

Examples of traffic analysis reports:

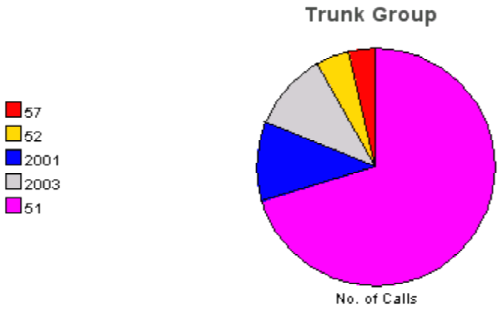
Traffic Analysis
Trunk Group

Thursday, September 13, 2012

Filter: Date/Hour is Last Two Months

PCX : 10

Trunk Group	Duration	No. of Calls
51	57:16:00	78
2001	00:59:47	12
2003	02:39:39	12
52	00:00:00	5
57	00:18:30	4
Total	**61:13:56**	**111**



Hit lists

Gives the top N most costly extensions, most costly directions etc. (N: user defined, 10 by default)

- Cost by directory entry (1)
- Cost by user groups
- Cost, duration by set

Hit-List
Duration By Cost Center

Thursday, September 13, 2012

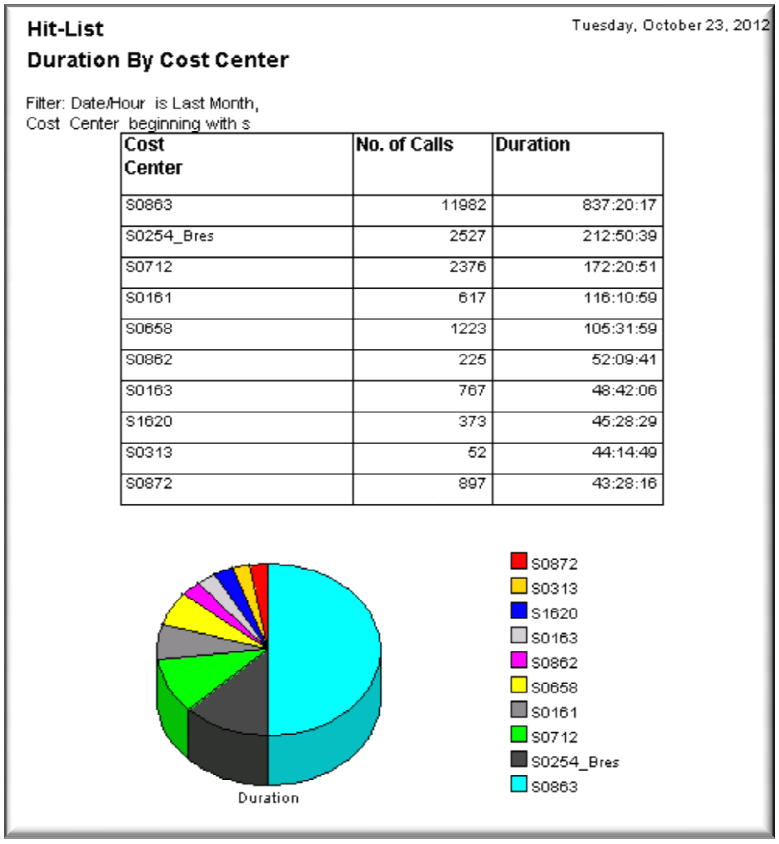
Filter: Date/Hour is Last Two Months

Cost Center	No. of Calls	Duration
	193174	13182:18:34
S0254_Bres	18070	1569:58:14
S0863	10070	754:30:47
S0712	5868	376:43:57
S0161	1015	213:07:54
S0658	2164	208:02:27
S0255-ND5	1219	163:18:51
S0872	2874	153:56:38
RFS	395	129:47:50
F4C56100	323	111:52:11
S1620	487	92:26:26
S0313	134	81:56:00
S0163	914	81:43:47
S0255-ND1	825	76:43:52
S0107	276	62:57:05

- Cost, duration by cost center

- Number of called numbers
- Cost by directions

Example of hit list:



Hit-List

Tuesday, October 23, 2012

Duration By Cost Center

Filter: Date/Hour is Last Month,
Cost Center beginning with s

Cost Center	No. of Calls	Duration
S0863	11982	837:20:17
S0254_Bres	2527	212:50:39
S0712	2376	172:20:51
S0161	617	116:10:59
S0658	1223	105:31:59
S0862	225	52:09:41
S0163	767	48:42:06
S1620	373	45:28:29
S0313	52	44:14:49
S0872	897	43:28:16

(1) Not available for OmniPCX Office

Subscription report definitions

There are six predefined report definitions on subscription, detailed in Subscription reports.

DISA report definitions

There are four predefined report definitions for DISA use:

Hourly, daily, monthly synthesis of the calls, and monthly DISA use.

Threshold monitoring report definitions

There are three predefined report definitions on threshold monitoring, detailed in Tracking reports.

The OmniVista 8770 offers both predefined reports and the capability to create customized reports.
Summary of reporting process:

- The OmniVista 8770 automatically retrieves call and traffic information from OmniPCX Enterprise CDRs and Traffic counters using standard protocol (FTP/SFTP)
- To compute telephone costs, the OmniVista 8770 uses the carrier tariff information which specifies cost according to the designated factors: caller origin (trunk node) and call destination. Reports on telephone costs and traffic can be consolidated by using predefined or customized comprehensive reports.

About carrier tariffs

To compute telephone costs, the OmniVista 8770 needs the Carrier Tariff information which specifies cost according to caller origin (trunk node) and call destination. The Carrier Tariff information is defined in the OmniVista 8770 accounting application tab: Carriers. This information includes:

- The applicable tariff (local, national , international, mobile)
- Region identified by the starting digit Number
- In each region, the designated OmniPCX component which is managed (full OmniPCX or an OmniPCX trunk group)
- The Direction: calling region to called region. If a single OmniPCX is managed, the direction can be from any region [empty field]) to a specific region.
- The Tariffs to apply to each direction, The above information can be collected in text files, specifically as a code book, which can be imported into OmniVista 8770.

The carrier configuration contains other specialized features including:

- Carrier comparison
- Calendar
- Tracking

1.12.10 Customized accounting reports

In order to customize reports, administrators use the OmniVista 8770 NMS Reporter application. The Reporter is a powerful tool designed to create or modify reports and report definitions. The Reporter can be used for the Accounting, Traffic analysis, Alarms and Audit modules.

Customized report definitions can be newly created or from existing report definitions in order to fulfill specific needs or adapt the presentation.

This allows specification of the information to be presented, the sort and selection criteria, the headers and other data.

1.13 Traffic analysis

As your organization grows, your communication system needs to be permanently monitored:

- Is your on-site infrastructure (DECT/PWT) well designed?
- Does your installation have enough bandwidth to handle the overall traffic to carrier networks?
- Do your attendants answer calls fast enough?

Managers expect their Network Management System allow them to optimize the capacity, ensure the quality of the network, support a wireless DECT/PWT infrastructure and save telecommunications costs.

Here are some examples of information provided by Traffic analysis:

- Measurement of response time
- Statistics on the line-occupancy ratio for incoming calls
- Reports on attendant and user traffic
- Occupancy rates of the different internal and external links
- Average time spent waiting for an attendant
- Base station traffic analysis for capacity control of cells

This information is provided through predefined or customized reports. OmniVista 8770 allows network managers to schedule reports and then receive them by automated e-mail, as well as access them from anywhere on the intranet. This application is only available for OmniPCX Enterprise.

1.13.1 Application principles

The reports are based on the information contained in the OmniPCX Enterprise traffic observation counters, and on the CDRs generated by the OmniPCX Enterprise for each call. The counters files are generated every 30 minutes every day, using the values of the counters for the different entities (trunk groups, attendants, attendant groups, DECT). They are retrieved from the OmniPCX Enterprise by file transfer (FTP) and stored in the OmniVista 8770 database.

Two methods are used to limit the amount of data to be stored in the database:

- Filters can be configured to limit the import of counters on defined entities
- From the 30 mn counters provided by the OmniPCX Enterprise, the OmniVista 8770 generates total counters each day, month and year. Various periods of storage for these counters are configured by default.

The statistics are presented in a report which can be filtered on such factors as entity, busy hour, and display of hit-list. The busy information presented as minutes of occupation within the observation period is readily available for customer-specific traffic engineering. Erlang calculations for engineering can be added in a customized report.

1.13.2 Predefined traffic analysis report definitions

A set of predefined report definitions is provided per half hour, hour, day, month, for:

- Trunk groups
- Attendants
- Attendant groups
- Called extensions
- Stations
- DECT/PWT

Dynamic filters in those report definitions allow the network manager to generate a report for a specified period, a node in the network, an object of the node.

The network manager can view the report results in a table and graphical layout. The manager can customize and save performance report definitions.

The network manager can also automatically schedule the generation of a report, e.g., create each month a report on the average waiting time for an attendant group.

The network manager can also export the OmniVista 8770 reports to a standard spreadsheet like Excel in order to archive, redesign, or include it in an external billing report.

Examples of predefined performance report definitions:

- Traffic for trunk groups, hit list
- Incoming calls processing for the attendant groups
- Distribution of calls for one attendant (incoming/outgoing)
- Called extension average waiting time

Example 1: Incoming calls processing for the different attendant groups:

Attendant Groups \ **Total Reports** Friday, October 19, 2012

Incoming Calls Processing

Filter: Date is Last Two Months

External Incoming (Direct)	2554
External Incoming (No answer at station)	2389
External Incoming (No answer Grp/Att)	0
External Incoming (Recall)	148

External Taken	4462
External Taken (< T1)	3174
External Taken [T1 T2]	842
External Taken (> T2)	446
Avg wait time external taken	00:00:04
External Aband.	620
Avg wait time external aband.	00:00:09

PCX Incoming (Direct)	316
PCX Incoming (No answer Grp/Att)	0
PCX Incoming (Recall)	20

PCX Taken	261
PCX Taken (< T1)	174
PCX Taken [T1 T2]	54
PCX Taken (> T2)	33
Avg wait time PCX taken	00:00:04
PCX Aband.	54
Avg wait time PCX aband.	00:00:05

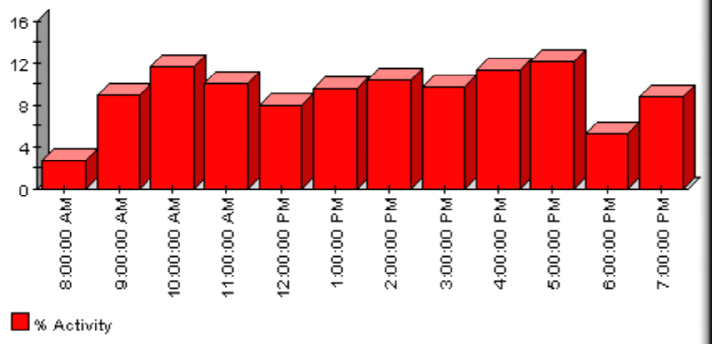
Example 2: Hourly report: activity rate of the attendants

Friday, October 19, 2

Attendant \ **Hourly Reports**

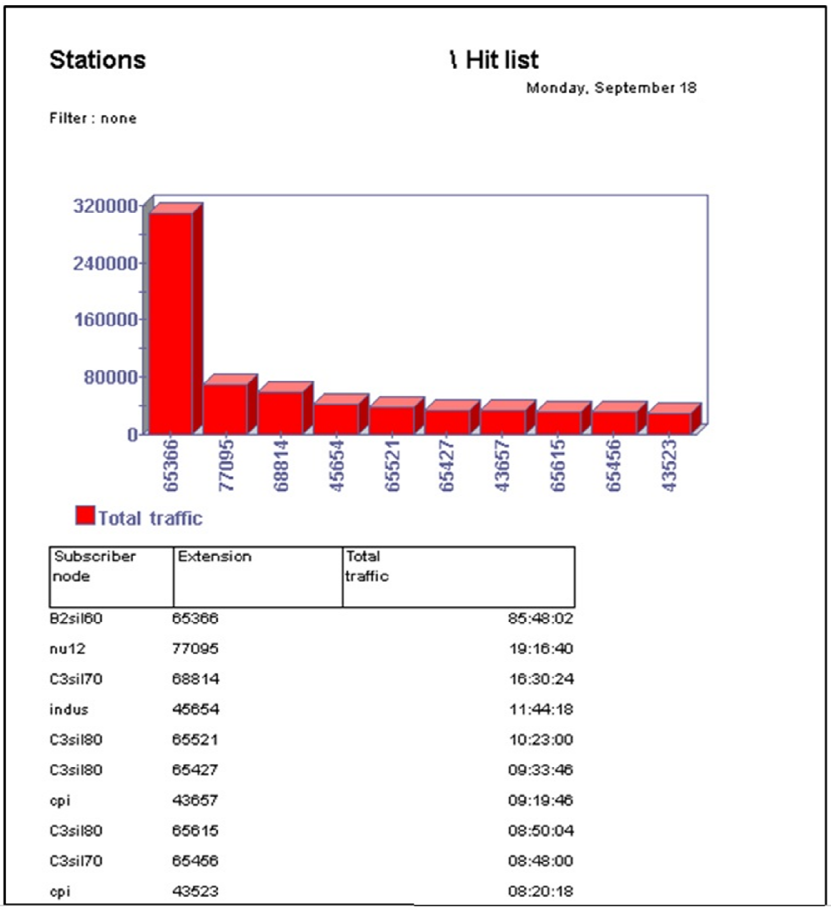
Activity rate

Filter: Date is Last Month,
Hour greater than or equal to 8:00 AM and less than or equal to 8:00 PM



Hour	% Activity
8:00:00 AM	2.76 %
9:00:00 AM	8.93 %
10:00:00 AM	11.71 %
11:00:00 AM	10.15 %
12:00:00 PM	7.93 %
1:00:00 PM	9.53 %
2:00:00 PM	10.46 %
3:00:00 PM	9.79 %
4:00:00 PM	11.35 %
5:00:00 PM	12.09 %
6:00:00 PM	5.22 %

Example 3: Hit list: 10 first stations sorted by call duration, incoming and outgoing



Subscriber node	Extension	Total traffic
B2sil60	65366	85:48:02
nu12	77095	19:16:40
C3sil70	68814	16:30:24
indus	45654	11:44:18
C3sil80	65521	10:23:00
C3sil80	65427	09:33:46
cpi	43657	09:19:46
C3sil80	65615	08:50:04
C3sil70	65456	08:48:00
cpi	43523	08:20:18

1.14 Reporter tool

The Reporter application includes powerful tools to create, modify and delete reports and report definitions.

The Reporter is used for the Accounting, Traffic analysis, Audit and Alarms applications, and VoIP Performance for OmniPCX Office.

Predefined report definitions (e.g. Accounting: detailed report per extension) are delivered within the OmniVista 8770.

Customized report definitions can be made from predefined ones (e.g., Detailed report per extension for the Commercial Department on calls > $100) or newly created.

Reports can be generated using report definitions, and then exported to different formats: Excel, PDF, txt, HTML, or sent by e-mail.

The report generation, export and notification by e-mail can be scheduled automatically by OmniVista 8770.

Dynamic filters can be defined in a report definition to limit the scope when generating reports (for a specific period, for a specific node in the network, etc.).

1.14.1 Predefined report definitions

OmniVista 8770 comes with a set of ready to use report definitions. These report definitions meet most needs: controlling and assigning costs, analyzing service quality, re-billing, telephone costs control panel, usage monitoring, etc.

See Accounting, Traffic analysis and Alarms sections for the list of predefined reports.

1.14.2 Customized report definitions

Customized report definitions can be newly created or created from existing report definitions in order to fulfill specific needs or to adapt the presentation. This allows specification of the information to be presented: the sort and selection criteria, headers and other data.

This customization can be performed through OmniVista 8770 Reports Query and Design tools.

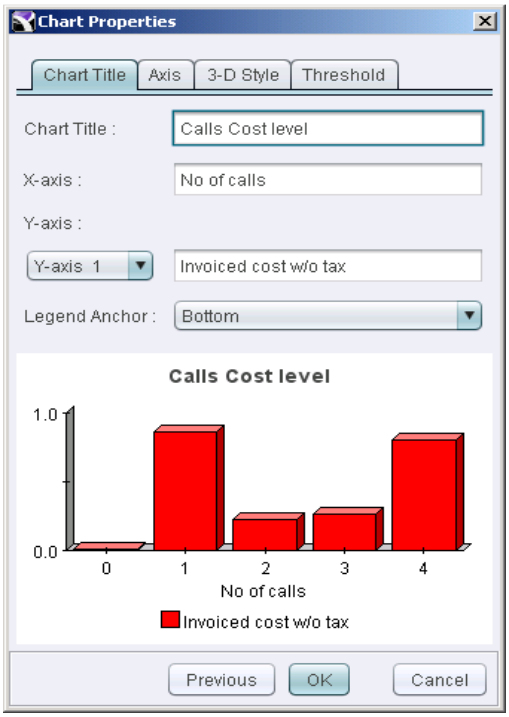
The Designer tool is used to create customized templates, including non-changing information, such as headers and footers, fonts and font sizes, background colors, page breaks, table size, etc.

The Designer is a powerful tool to customize predefined report definitions using the company's logo and fonts, for example.

In the same way, the Query tool allows definition of dynamic information to be displayed, titles of each column, filtering and sorting criteria, operations (total, average, etc.).

1.14.3 Graphical reports

In addition to the table format, the reporting application can display graphs like bar charts and pie charts, created using the Designer. Customization of the title, axis name, 3-D style, etc. Several graphs may be displayed in the same report.



1.14.4 Export format

Reports may be exported to the following file formats:

– **TXT**: The exported report is displayed as a table in a text file. Formulas and charts do not appear.

- **PDF**: The report is exported to a PDF file. The exported report may be viewed using any standard PDF viewer. The exported report graphically matches the one that appears on the screen, without the vertical navigation tree.
- **HTML**: The report is exported to an HTML file. Graphical items, such as a pie chart, are saved separately as PNG files. The exported report may be viewed using any standard HTML browser. The exported report graphically matches the one that appears on the screen, without the vertical navigation tree.
- **XLS**: The report is exported to an Excel file. The exported report may be viewed using Excel. The data are inserted in a table in an Excel spreadsheet, matching the one that appears on the screen, without the vertical navigation tree and the graphs.

1.15 Performance

To achieve a level of visibility that VoIP deployments require it is necessary to monitor both audio and signaling quality performance indicators that impact call quality before, during, and after a VoIP deployment. Analysis technology must be able to capture VoIP PBX generated performance statistics. It must collect, measure, analyze and correlate results from IP-PBX VoIP call detail records.

OmniVista 8770 Performance monitoring application can measure VoIP performance indicators within a network carrying VoIP traffic to baseline performance, obtain real-time troubleshooting diagnostics and alarm on problems. OmniVista 8770 Performance monitoring application provides the critical information necessary to plan for a VoIP deployment, to pre-empt post deployment problems and to optimize resources to maximize return on the Voice over IP network investments (ROI). The tool provides visibility into geographically dispersed, multi-technology converged OmniPCX Enterprise and OpenTouch networks. It enables IT and VoIP managers to monitor, analyze, manage and predict OmniPCX Enterprise and OpenTouch performance from a single centralized location.

The OmniPCX Enterprise and OpenTouch consist of variety of components each of which produces data related to performance monitoring:

- A Linux based processor
- VoIP equipments, which are also referred to as couplers (INT-IP for 4400 racks, GA/GD for MG, IP voice mails 4645)
- IP-Phones which may be either software running on a PC as IP desktop softphone, or a VoIP capable telephone set as 8 Series (some previous generation sets are also supported as 4035 IP, 4020 IP, 4010 IP and IP Softphones 4980)

This section will provide the following information:

- Data collection and alarming for data available from the OmniPCX Enterprise and OpenTouch systems, including:
  - SNMP data collection of systems performance from the UC-Davis MIB.
  - Bulk data collection of VoIP statistics tickets to provide per-call performance data.
- Performance features that support analysis of VoIP performance for the OmniPCX Enterprise and OpenTouch data, including:
  - Network Thresholding and Alarming capabilities associated with VoIP monitoring
  - Network VoIP Quality Indices and Heat charts
  - MOS score parameter tuning
  - MOS score calculations
- Reporting on performance, including:
  - Predefined reports that include data from the OmniPCX Enterprise and OpenTouch based collectors.

- ART reports based on OmniPCX Enterprise and OpenTouch VoIP statistic ticket data

1.15.1 Data collection

Performance application can collect three major kinds of performance data from the OmniPCX Enterprise and OpenTouch:

1. Platform Health - SNMP based data collection is used to gather device performance statistics from the UC-Davis MIB
2. VoIP QoS - Bulk data collection of the VoIP statistics tickets is used to obtain per-call VoIP QoS metrics. These VoIP statistics tickets are generated for each VoIP call by the OmniPCX Enterprise and OpenTouch. Note that these records are only generated when an end user makes a VoIP call. If there are no calls being made (outside of business hours for example) then no VoIP QoS measurements will be collected for those periods.

1.15.1.1 SNMP data collection from the UCD-Davis MIB

In order to provide the VoIP services you need at critical load times, the base processor needs to perform in the most efficient manner. VitalNet provides a set of SNMP data collectors that gather data from the UC-Davis MIB for reporting on Linux based device performance. The data collection interval is 5 minutes by default, and may be adjusted to any interval between 1 minute and 60 minutes depending on customer requirements for data granularity. The Net-SNMP collector set includes the following collectors:

– **Net-SNMP processes collector** – This collector displays, by default, the following information on the Network Operations page for each process that is selected by the Linux administrator when SNMP services are enabled. Note: the administrator must select the processes to be monitored. If no processes are selected, no data is provided in the MIB and the collector cannot gather any information:

Net-SNMP processes collector data

Value	**Units**	**Thresh**	
		High	**Low**
Minimum number of processes of this type	Count	No	No
Maximum number of processes of this type	Count	No	No
Average number of processes of this type	Count	Yes, no default	Yes, no default
CPU time used by processes of this type	Seconds	Yes, no default	Yes, no default
Memory usage by processes of this type	KB	Yes, no default	Yes, no default

– **Net-SNMP memory COLLECTOR** – This collector displays, by default, the following information on the Network Operations page for each OmniPCX Enterprise Linux device:

Net-SNMP memory collector data

Value	Units	Thresh	
		High	Low
Peak Memory Utilization	%	Yes, default = 70%	Yes, no default
Peak Swap Utilization	%	Yes, default = 70%	Yes, no default
Average Memory Utilization	%	Yes, default = 70%	Yes, no default
Average Swap Utilization	%	Yes, default = 70%	Yes, no default
Buffered Memory	KB	Yes, no default	Yes, no default
Cached Memory	KB	Yes, no default	Yes, no default

– **Net-SNMP disk collector** – This collector displays, by default, the following information on the Network Operations page for each disk:

Net-SNMP system disk collector

Value	Units	Thresh	
		High	Low
Disk Path	Text String	No	No
Total Disk Size	KB	No	No
Average Disk Utilization	%	Yes, default = 70%	Yes, no default
Peak Disk Utilization	%	Yes, default = 70%	Yes, no default
Inodes Used	%	Yes, default = 70%	Yes, no default

Net-SNMP system load collector – This collector displays, by default, the following information on the Network Operations page for each disk:

Net-SNMP system load collector data

Value	Units	Thresh	
		High	Low
Load Average Name	Text String	No	No

Average Load Average	LA	Yes, default = 300	Yes, no default
Peak Load Average	LA	Yes, default = 300	Yes, no default

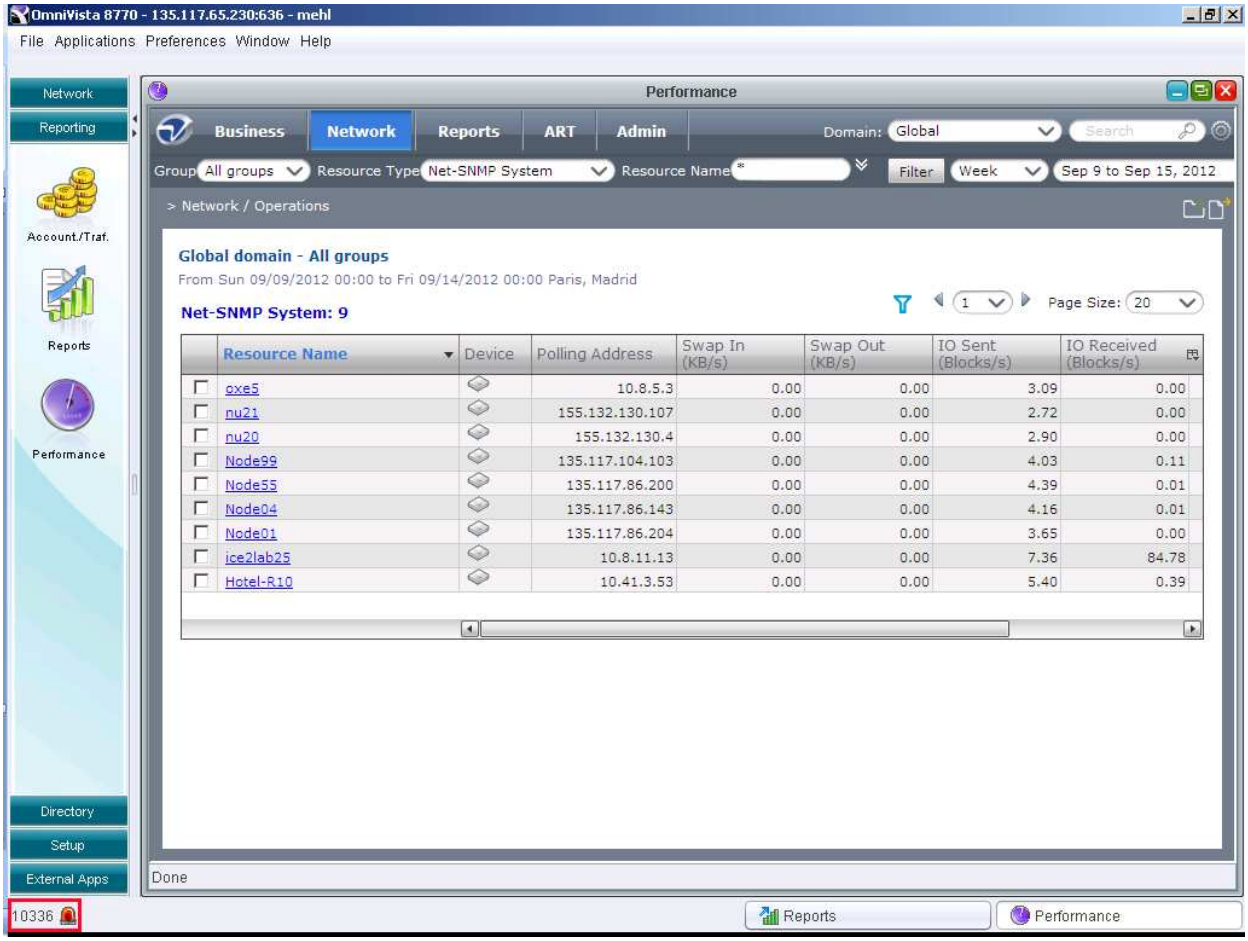
– **Net-SNMP system collector** – This collector display, by default, the following information on the Network Operation page for each Linux device:

Net-SNMP system collector data

Value	**Units**	**Thresh**	
		High	**Low**
Memory swapped In from disk	KB/sec	No	No
Memory swap out to disk	KB/sec	No	No
Blocks sent to IO device	Blocks/sec	No	No
Blocks received from IO device	Blocks/sec	No	No
Average CPU Utilization	%	Yes, default = 85%	Yes, no default
Peak CPU Utilization	%	Yes, default = 85%	Yes, no default

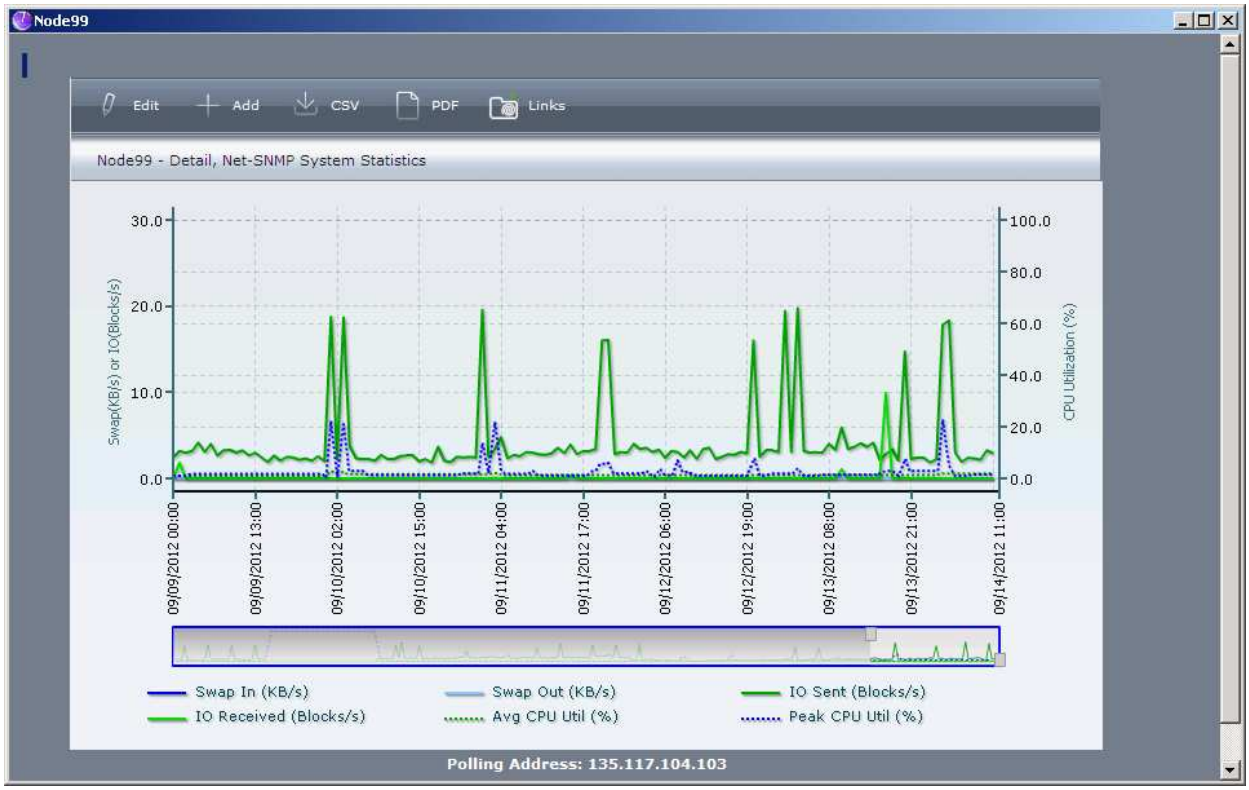
Note: For all values with "Yes, no default": a threshold may be defined, but a default value is not provided. OmniVista 8770 will not generate an alarm based on this criterion until a value is defined.

All SNMP based collectors support presentation of data through the Network Operations page. This page displays data for resources that a user has permission to view as tables. An example is shown below, for the Net-SNMP System collector.



Network Operations page for Net-SNMP system collector

If you select the resource name link found in the first column of the data window on the Operations page, you can view a graph of the data as illustrated in the figure below for one of the Net-SNMP System collector resources



Network operations page graph for Net-SNMP system collector resource

1.15.1.2 OmniPCX and OpenTouch VoIP statistic ticket collectors

The OmniPCX Enterprise and OpenTouch VoIP Statistics tickets are a rich source of Voice over Internet Protocol (VoIP) call quality information. The OmniPCX Enterprise and OpenTouch systems create a VoIP ticket at the termination of each VoIP call.

Data collection occurs as follows:

- In OmniPCX Release 8.x, Performance collects and analyzes these VoIP tickets once per hour via FTP
- In OmniPCX Release 9.0 and later, VoIP tickets are generated "on the fly". OmniVista 8770 collects and analyzes these VoIP tickets every 5 minutes via UDP

For each data analysis period, OmniVista 8770 aggregates VoIP ticket data from all the VoIP calls received and produces metrics for several different OmniPCX resource types:

- OmniPCX device
- OmniPCX coupler
- Each IP phone

For example, if a given OmniPCX 9.0 device handled 59 VoIP calls in a 5 minutes period, those 59 calls will be aggregated to produce VoIP QoS statistics in the Performance application for that OmniPCX device. If 4 of those calls were to or from a specific IP phone, then those 4 calls will be aggregated to product VoIP QoS statistics for that specific IP phone. This approach allows network managers to easily compare VoIP performance of different OmniPCX devices, OmniPCX couplers, and individual IP phones.

The following performance metrics are provided on the Network operations page in a manner consistent with the illustration provided in figure: Network Operations page for Net-SNMP system collector and figure: Network operations page graph for Net-SNMP system collector resource, to provide users with a view of call quality properties for each of the data sets:

table 1.11: VoIP Metrics for OmniPCX Enterprise collectors (OmniPCX device, coupler, or IP phone)

Value	**Units**	**Threshold**	
		High	**Low**
Average Voice Quality of Service	%	Yes, no default	Yes, default = 80%
Average Call Duration	sec	Yes, no default	Yes, default = 2 sec
Call minutes	min	Yes, no default	Yes, no default
Average R-factor	#	No	No
Minimum R-factor	#	No	No
Average MOS score	#	Yes, no default	Yes, default = 3.5
Minimum MOS score	#	Yes, no default	Yes, default = 2.5
Average Packet Loss	%	Yes, default = 1%	Yes, no default
Maximum Packet Loss	%	Yes, default = 3%	Yes, no default
Average Jitter	ms	Yes, default = 40 ms	Yes, no default
Maximum Jitter	ms	Yes, default – 80 ms	Yes, no default
Average Delay	ms	Yes, default = 100 ms	Yes, no default
Maximum Delay	ms	Yes, default = 200 ms	Yes, no default

1.15.2 Analyzing VoIP performance

The following sections describe several features that Performance application provides that allow you to monitor and manage the way you monitor your VoIP call quality.

1.15.2.1 OmniPCX and OpenTouch VoIP statistic ticket collectors

Performance application provides the ability to define thresholds on many of the data values it displays on the Operations page. Most data values may have a High and/or a Low threshold defined. If data exceeds a High threshold, or drops below a Low threshold, an alarm is generated. If no value

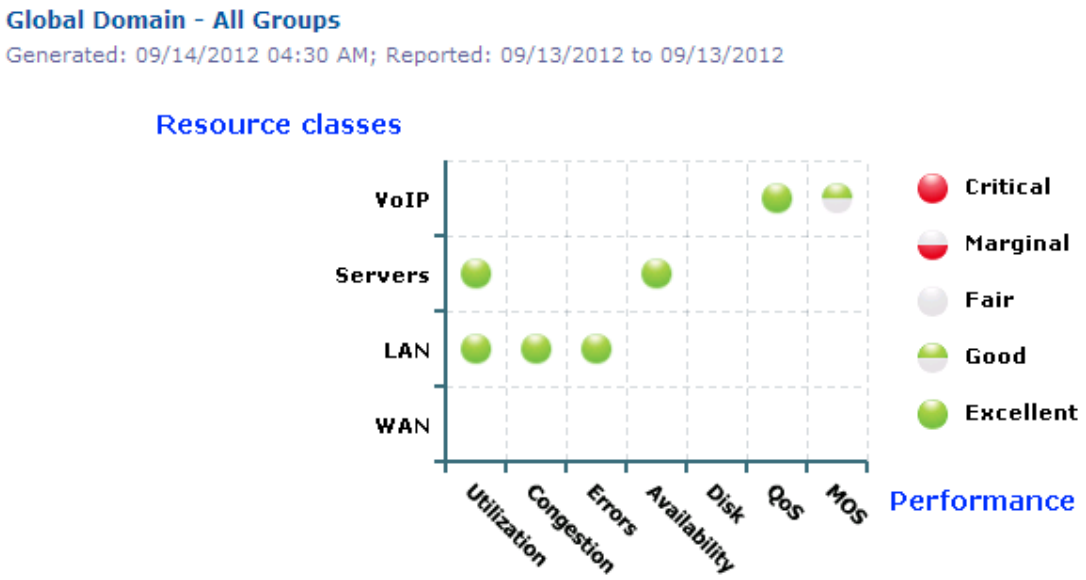
is defined for a High or Low threshold, then the data will not be evaluated for alarm generation against that boundary.

The thresholds that are provided, by default, for the Net-SNMP, OmniPCX statistic ticket, and VoIP Agent collectors are described with the data in the preceding tables. In cases where it is possible to define a threshold, but a value has not been supplied by default, Performance application will not evaluate the data for being under, or exceeding the threshold until a value has been defined. Likewise if a default value has been supplied and the user does not wish to have that data evaluated for alarms, the administrator may remove the defined default threshold value.

When data exceeds an upper bound threshold, or drops below a lower bound threshold, Performance application will generate an alarm. Alarms may be reviewed in the OmniVista 8770 Alarms application.

1.15.2.2 VoIP quality index and heat charts

One of the unique ways OmniVista 8770 Performance application displays network performance is through Heat Chart displays.



Network summary heat chart

The Network Summary Heat chart includes cells to reflect the calculated quality index values of the VoIP services and the MOS scores for your network. As the quality of your network degrades the cells in the heat chart will change from Green to reds. If you place your mouse over a cell, you will be shown the number of resources that are at each of the quality index levels (critical, marginal, fair, good and excellent). If you select a cell in the heat chart you can display a Network summary report for that cell that will help you determine the source of the problem.

1.15.2.3 MOS score parameter tuning

Mean Opinion Scores (MOS) are an industry wide standard used to evaluate call quality as defined by International Telecommunications Union (ITU) standard ITU-T Recommendation G.107 (03/2005). This standard is also used by OmniVista 8770 to provide the MOS score and R-factor values for each call record in the OmniPCX Enterprise and OpenTouch VoIP statistic ticket file, and for the performance measurements supplied for the OmniPCX Enterprise and OpenTouch devices, the OmniPCX Enterprise couplers, and IP Phones.

The formulae used to determine the MOS score and R-factor values that are calculated use a variety of parameters that describe the calling phone's environment, the called phone's environment, and properties of the overall call, as well as specific performance measurements about each call. OmniVista 8770 permits the administrator to provide values for the calling phone, called phone, and over all call properties and uses values supplied in the VoIP statistic tickets to obtain the specific performance measurement values.

By default, the environment parameters are supplied with values defined as defaults by the ITU.

1.15.2.4 VoIP reporting

OmniVista 8770 Performance provides two forms of reporting that include VoIP performance information. Several basic standard reporting features are a part of the Network tab, while the more sophisticated reporting features of ART tab can also be used to benefit from reports that provide the precise details you may be seeking in specific network scenarios. The following sections describe these reporting capabilities as they relate to the performance data available from the OmniPCX Enterprise and OpenTouch.

Network tab VoIP reporting

Executive reports

Network tab supplies Network Overview report as an Executive report. This report includes a bar chart that shows the quality index value of the network by technology. A bar is displayed that represents the VoIP quality for the network which would include the OmniPCX Enterprise and OpenTouch statistic ticket collector data. A bar is also provided for Servers which includes the Net-SNMP collector based performance data from the OmniPCX Enterprise and OpenTouch.

Network manager reports

Network tab provides several Network Manager Reports that include VoIP performance information. This includes the following:

- Network Overview
- Network Summary – This report includes a section that provides the "Network Quality Exception Leaders" which include the resources with the worst Quality Index values. Any of the OmniPCX Enterprise and OpenTouch related resources from the Net-SNMP data collectors, OmniPCX Enterprise and OpenTouch Statistic Ticket data collectors
- Server Summary – This report includes a section that provides the "Quality Exception Leaders" which displays the resources with the worst Quality Index values for resources from the Servers resource class. The resources from the Net-SNMP data collectors are in the Servers resource class and, as a result, have the potential to be displayed in this section if their performance is poor enough.
- VoIP Summary – This report includes the following graphs for the VoIP across the network. OmniPCX Enterprise and OpenTouch data will contribute to the values displayed in each of the following charts:
  - VoIP Call Minutes by Hour for the day view (by day for the week view, and by week for the month view)
  - VoIP Quality by Hour (or by Day, or by Week)
  - Average MOS by Hour (or by Day, or by Week)
  - Packet Loss Quality by Hour (or by Day, or by Week)
  - Jitter quality by Hour (or by Day, or by Week)
  - Delay quality by Hour (or by Day, or by Week)
  - Voice QoSΔ Quality by Hour (or by Day, or by Week)

- VoIP Quality Exception Leaders – this chart displays the resources from the VoIP resource class with the worst Quality Index values. The resources from the OmniPCX and OpenTouch VoIP Statistic Ticket data collectors have the potential to appear in this list if their performance is poor enough.

– VoIP Group Comparison and VoIP Domain Comparison – these two reports allow you to view the following values as they pertain to either the reporting groups in the domain that you are working from (Group Comparison) or the sub-domains of the domain that you are working from (Domain Comparison). The following are provided with information for each reporting group or sub-domain:
  - VoIP Call Minutes
  - VoIP Quality
  - Average MOS Score
  - Packet Loss Quality
  - Jitter Quality
  - Delay Quality
  - Voice QoS Quality

– VoIP Network Comparison – this report includes the following charts that may be useful in understanding how VoIP service performance relates to various network properties. The following line charts provided in this report include information about OmniPCX Enterprise VoIP performance:
  - VoIP Quality and Network Utilization Quality – Provides values for VoIP Quality Indices, Network Quality Indices, and Network Utilization Quality Indices.
  - VoIP MOS and Network Utilization Quality – Provides values for Average MOS scores, Network Quality Indices, and Network Utilization Quality Indices.
  - VoIP QoS Details and Network Utilization – Provides values for Packet Loss Quality Indices, Jitter Quality Indices, Delay Quality Indices, and Network Utilization Quality Indices.
  - VoIP Quality Exception Leaders – this provides a list of the resources with the poorest values for Packet Loss Quality Indices, Jitter Quality Indices, Delay Quality Indices, and VoIP Quality Indices.
  - Network Quality Exception Leaders – provides a list of the resources with the poorest quality indices across the network, except for those included in the VoIP Quality Exception Leaders list.

Reports

Reports tab feature allows users to create reports that include Best/Worst Performer charts, Trend charts, and Group Comparison charts based on the data available from the data collectors on the system.

These reports may be kept personal or shared within the permission scope of the user who created them. The data values from the Net-SNMP collectors and the OmniPCX Enterprise and OpenTouch Statistic Ticket collectors may all be selected and used to provide any of the three types of charts.

1.15.3 ART VoIP reporting

ART tab supports report creation and generation for all collectors, including up-to-the-minute data, aggregated data, and reference data. For OmniPCX, this includes data from the Net-SNMP collectors, OmniPCX Enterprise collectors, and OmniPCX Enterprise and OpenTouch VoIP statistic records.

ART tab provides more sophisticated reporting capabilities that go beyond the standard Network tab reporting functionality described in previous section. These features include:

- Ability to report on individual VoIP calls – As described earlier in this document, OmniVista 8770 analysis is typically based on measurements aggregated from multiple VoIP calls. While this is useful, it is often helpful to be able to report at the level of individual VoIP calls, for example to troubleshoot a scenario where most VoIP calls had good QoS but a few had poor QoS. Some examples of per-call reports that ART can produce are as follows:
  - 10 worst calls by MOS in past hour
  - 10 longest duration calls yesterday
  - List of all calls received by a particular IP phone last week
  - etc
- Ability to generate complex graphical representations of your VoIP data, including charts, graphs, list formats, etc.
- Sophisticated filters - controls for including or limiting what VoIP data is included in a report
- Sophisticated report scheduling features mechanisms to generate reports either once, or on a repeated basis.
- Access to all fields in the VoIP ticket – note that Network tab analysis is limited to a certain subset of data fields contained in the VoIP tickets. ART reports have access to the entire record, and these fields can be displayed in report output, or used to filter which VoIP tickets get included in the report. Examples:
  - OmniPCX and OpenTouch name
  - OmniPCX and OpenTouch IP address
  - Start time of the communication
  - End time of the communication
  - Rack number for the gateway (coupler)
  - Gateway (coupler) number
  - Equipment Type number
  - Equipment Type name
  - IP address of the IP-phone or gateway providing the ticket
  - IP address of the IP-phone or gateway that is the callee
  - Duration of the call
  - Compression algorithm code
  - RTP packets received
  - RTP packets sent
  - RTP packets lost
  - Maximum round-trip time
  - Number of consecutive bad frame interpolations run
  - Indication if the communication was encrypted
  - Local date and time of the device that sent the ticket
  - Number of times the ethernet driver has been restarted
  - QMC driver problem code

- Packet Loss Ratio (calculated and provided by OmniVista 8770 Performance application based on the data in the statistic ticket)
- Delay (calculated and provided by OmniVista 8770 Performance application based on the data in the statistic ticket)
- Jitter (calculated and provided by OmniVista 8770 Performance application based on the data in the statistic ticket)
- Packet Loss QoS (calculated and provided by OmniVista 8770 Performance application based on the data in the statistic ticket)
- Delay QoS (calculated and provided by OmniVista 8770 Performance application based on the data in the statistic ticket)
- Jitter QoS (calculated and provided by OmniVista 8770 Performance application based on the data in the statistic ticket)
- Voice QoS which is the lowest of the Packet Loss QoS, Delay QoS, and Jitter QoS values (calculated and provided by OmniVista 8770 Performance application based on the data in the statistic ticket)
- R factor calculation (calculated and provided by OmniVista 8770 Performance application based on the data in the statistic ticket)
- MOS Score (calculated and provided by OmniVista 8770 Performance application based on the data in the statistic ticket)
- ...

Based on this data it is possible to create a wide variety of reports that support many different VoIP reporting needs. A few examples are listed below:

- A report that shows all statistic tickets for calls made from a given IP-phone number that started within a given time range
- A report that shows the start date, start time, call duration, caller phone number and callee phone number for all statistic tickets for calls to, or from, a given IP-phone number where the MOS score that is below a given value
- A report that shows all the statistic tickets generated by a group of IP-phones during a given time frame

Predefined reports are:

Report Definition Name	Description
Call Admission Control	Displays the OmniPCX Enterprise Call Admission Control (CAC) by IP address
Ethernet Link Traffic	Displays Ethernet link traffic
OXE Devices	Displays the OmniPCX Enterprise devices by IP address
OXE Resources	Displays the OmniPCX Enterprise resources by IP address
System Performance	Displays system performance data for Load, Disk, CPU and Memory
VOIP by Coupler	Displays VoIP statistics by coupler
VOIP by IP Address	Displays VoIP statistics by IP address
VOIP by Node	Displays VoIP statistics by node
OpenTouch Messaging	Displays statistics for the whole OpenTouch messaging service

1.15.4 Capacity planning

To provide an aid to future planning, the evolution trends can be illustrated in reports, trend report on VoIP quality, and Call Server performance counters.

The planning component also projects estimated values for the following periods:

- The coming month
- The next three months

- The next six months
- The next year (12 months)

Note: The trend reports are based on the past network statistics; the preceding period of input is important to be of value.

The capacity planning capability tracks data for several factors, the principle ones for network planning include:

- LAN volume and average utilization
- OmniPCX and OpenTouch CPU: CPU Utilization (%)

1.16 Accounting and VoIP Ticket collector

OmniVista 8770 provides an interface "Ticket collector" to export the OmniPCX and OpenTouch Accounting CDRs for an external application (billing application, etc.). The Ticket Collector SDK and documentation are available for the registered partners on the Alcatel-Lucent Application Partner Program. Ticket Collector license is orderable through OmniVista 8770 application in ACTIS.

The Ticket Collector allows the export to various files, stored in a local or external directory in the PBXs' format.

The VoIP CDR Ticket Collector feature is the same as the Ticket Collector, except that instead/in addition to Accounting CDRs, VoIP CDRs are collected. The license "Ticket Collector" is the same. VoIP Statistics records contain various data items (codec used, jitter impact, packet loss, delay...) designed to identify the causes of potential problems with IP devices connected to a OmniPCX and OpenTouch that could result in a bad Quality of Service (QoS). The data collected can be exported to third party applications to provide Statistics records for analysis.

1.17 Integration into standard management platforms

Standard management platforms provide solutions to manage multi-vendor heterogeneous IP networks.

The integration of OpenTouch Suite with leading standard Network Management Platforms provides a solution to manage a Voice and Data converged Enterprise Network.

1.17.1 Integration in VitalSuite® performance management

The Alcatel-Lucent VitalSuite® Performance Management software solutions centrally manages performance and predicts behavior of multi-vendor IT and Internet telephony infrastructure resources, services, network and application-based business processes at both the enterprise and service provider levels. The modules include VitalNet, VitalApps and VitalART.

VitalSuite is a richly functional performance management solution for production-level enterprise applications and IP telephony services. It pre-empts network and application problems before users are affected, and maximizes network uptime by efficiently tracking problems to their source. Its breadth of functionality, in particular, its ability to address VoIP requirements across both the network and application, in terms of availability, performance, and service usage and impact – position VitalSuite well to provide a highly competitive approach to managing production-level VoIP environments.

VitalNet is a multi-vendor, multi-technology platform designed to support users throughout the network management organization. By collecting granular statistics from SNMP-manageable devices, VitalNet is a valuable tool for network engineers and operations staff. By analyzing utilization, availability, and error statistics, VitalNet can validate service levels to ensure appropriately sized LAN, WAN circuits and PVCs. Capacity planners can also use VitalNet to proactively predict and prioritize which key network resources require upgrades to preempt problems before applications are impacted. Flexible reporting capabilities are designed to support the needs of technical staff and IT

management as well as business executives – who recognize the company's bottom line depends on overall enterprise network performance.

VitalNet has incorporated VoIP support for the Alcatel-Lucent VoIP environments. Performance management software for the enterprise as of 10.1.VitalNet collects call data records from the OmniPCX Enterprise as of 8.0 and OpenTouch to provide a broad range of call statistics including MOS, call attempts, successful versus failed calls, call minutes, etc.

As part of the VitalSuite R10.2 release, the VoIP Agent capability was enhanced to register with OmniPCX Enterprise Call Server (as of 9.0), to provide enhanced VoIP simulation for more realistic VoIP QoS monitoring. In addition, the administrators can now adjust detailed MOS calculation parameters to provide more accurate MOS measurement. IP Topology was also added to improve root cause analysis of performance related issues on the network.

VitalSuite R10.2 introduced feature for monitoring Genesys contact centers. This unique capability is an industry first. It provides a single Services view for Genesys Servers, Network and Applications that support the contact center.

1.17.2 Integration with other leading network management solutions

Management of converged platforms can be integrated with enterprise global network management platforms using mainly standard protocol SNMP.

For example:

- HP Openview® Network Node Manager
- IBM Tivoli® Network Manager
- CA Technologies Spectrum®

Main benefits:

- Customer use a standard network management platform with customization using standard NM platform capabilities.
- Monitoring of the global network is provided through an overview of the network. OpenTouch suite and OmniVista 8770 can be discovered in respect of Alcatel-Lucent equipments organization, and displayed on topology views. They are updated according to their status (icon color changing). OpenTouch suite private MIBs is integrated (depending on the Partner). OmniVista 8770 and OpenTouch suite SNMP traps are sent to the standard platform, where they are displayed in the associated event manager. A direct access to OmniVista 8770 can provide in-depth alarm analysis and configuration of an Alcatel-Lucent network element.

More information can be found in the Alcatel-Lucent Application Partner Guide or on https://applicationpartner.alcatel-lucent.com

1.17.3 OmniVista 8770 SNMP proxy

OmniVista 8770 SNMP proxy converts OmniPCX, OmniVista 8770 and OpenTouch alarms in SNMP traps.

It provides consolidated integration with enterprise global management platforms.

2 OmniVista 8770 MCS Edition

2.1 Managed Communication Services

Driven by low cost and high bandwidth connectivity, new markets have opened up for out-tasking and outsourcing of a range of Information and Communication Technology (ICT) services. More and more focused on their core business activities, multi-national companies are looking for:

- Investment in strategic assets only
- Single Point of Contact (SPOC) responsible for their solution worldwide
- Decrease contract management complexity
- Predictable costs, flexibility in operations
- Committed SLAs (Service Level Agreements)

To better fit to customer needs Alcatel-Lucent is now providing a new approach based on a user needs served by a service. In fact in some cases the customer doesn't want to buy the equipment with some features on it but a level of service that will respond to customer needs, and that can evolve.

Virtualized OmniVista 8770 MCS Edition is also offered in the Cloud for Unified Communication as a Service (UCaaS) management.

2.2 OmniVista 8770 MCS Edition key benefits

A key component of MCS is the OmniVista 8770 1.3 MCS Edition offer, which provides the Service Providers (Alcatel-Lucent Business Partners, Carriers, etc.) with two key benefits:

- Increase recurring services revenue with an enlarged portfolio of remote services which are highly automated – such as alarm monitoring & resolution, backups, upgrades, user MAC (moves, adds, changes), performance & accounting reports, asset management, etc.
- Reduced cost of operations by centralizing management and visibility of the customers' equipment with the Network Operating Centre, so that tasks are performed remotely instead of sending technicians on-site.

When a customer buys such services from the Service Provider, it means that they are out-tasking or outsourcing more of their management and operations. Thus, they have less staff in-house, and rely more on the service provider expertise and services. By building on this relationship, the service provider can increase customer loyalty, avoid commoditization and margin erosion.

All of Alcatel-Lucent products can be sold to customers in managed or hosted mode. The first step is to implement a Network Operating Centre with the OmniVista 8770 1.3 MCS Edition, installed on a physical server or virtualized, so that the service provider can remotely manage and operate the customers' equipment.

2.3 OmniVista 8770 MCS Edition

The OmniVista 8770 MCS Edition with the specific license "RSC" (Remote Service Center) includes the following applications:

- Unified user Management
- Device Management
- Configuration
- Operations Audit
- Alarm monitoring and Topology
- Accounting and Tracking

- Performance
- Directory
- Security
- 15 simultaneous client connections

The features of the OmniVista 8770 Business Edition are included in the MCS Edition. The additional features of the MCS Edition are listed below.

2.4 Report distribution to customer lists

This feature provides automatic reports distribution to customer's lists, to save operation time and enhance service business. The specific option MCS Edition is needed.

To manage these lists, a new MCS folder is displayed in the Administration. The administrators can create customers lists within this folder. MCS customers entries are managed in the Company Directory. The MCS customer entries contain information on the customers managed by a Network Operation Center:

- Company: Name, internet address, postal address, etc.
- Contacts: Name, telephone number, e-mail to send the reports
- Preferences concerning the reports format: PDF, Excel, TXT, HTML
- OpenTouch, OmniPCX associated to this customer

MCS customer entries are grouped in customers lists (for example, customers with contract "gold", customers "silver", etc.).

When generating a scheduled report, a new option "Customer schedule list" is offered. It allows scheduling the generation of a report for a customer's list, with the options print, export to a file (TXT, XLS, PDF, HTML), send by e-mail. The report will be automatically printed, or exported, or sent by e-mail to the customers list, tailored with the customer's name/address. The customer's preferences for the reports format are also taken into account, when present.

2.5 Additional reports

With the MCS Edition, 18 additional predefined reports are displayed. These reports are added to the existing numerous reports already delivered with OmniVista 8770. They have been added because there are relevant for alarms monitoring, performance analysis, and accounting reporting for MCS customers.

The feature "Distribution to customer lists" applies to these reports. When the customer's name/address is filled in, it is displayed in the report's header.

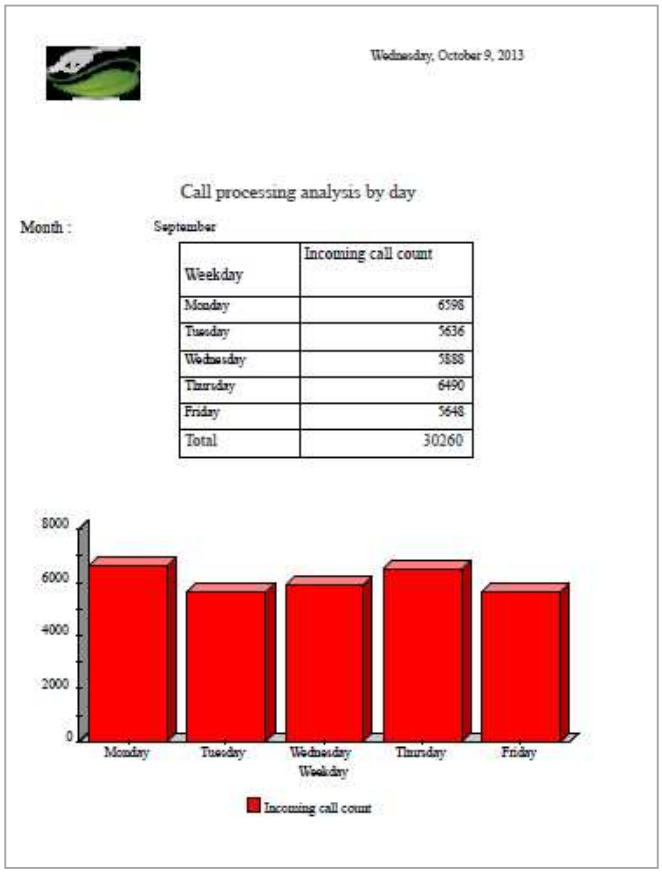
10 MCS accounting reports:

- Cost by station (1)
- Cost by cost center
- Cost by user group
- Answered calls (by station) (1)
- Non answered calls (by station) (1)
- Called numbers
- Direction type
- Call processing per week
- Call processing per day
- Call processing per hour

– Intra-day trunk group load analysis

(1): Extended format for the OXE user name available in the report.

Example 1: Call processing analysis per day:



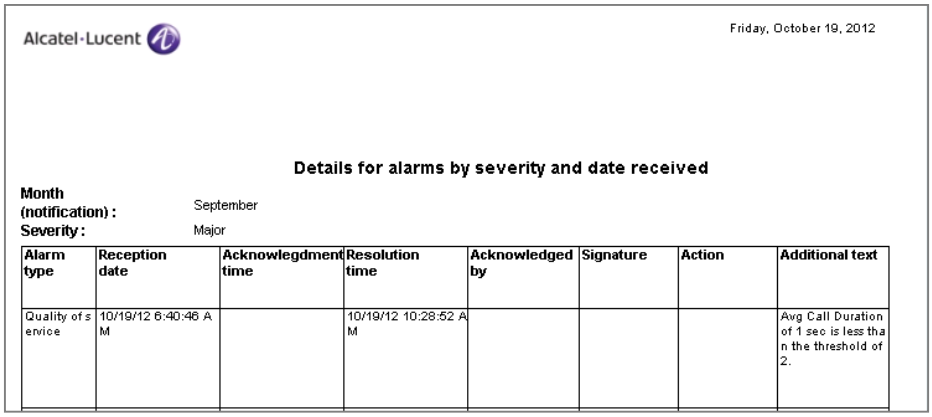
Wednesday, October 9, 2013

Call processing analysis by day

Month : September

Weekday	Incoming call count
Monday	6598
Tuesday	5636
Wednesday	5888
Thursday	6490
Friday	5648
Total	30260

1 MCS Alarm report: Alarms detailed by severity and resolution date:



Alcatel·Lucent

Friday, October 19, 2012

Details for alarms by severity and date received

Month (notification) : September
Severity : Major

Alarm type	Reception date	Acknowlegdment time	Resolution time	Acknowledged by	Signature	Action	Additional text
Quality of service	10/19/12 6:40:46 AM		10/19/12 10:28:52 AM				Avg Call Duration of 1 sec is less than the threshold of 2.

5 MCS reports on OmniPCX Enterprise Performance:

– Call processing analysis per attendant group

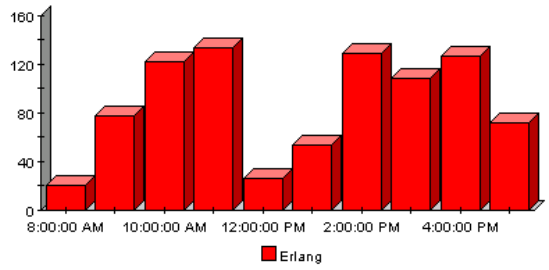
- Call processing analysis per week
- Call processing analysis per day
- Call processing analysis per hour
- Intra-day trunk group load analysis

Example 2: Intra-day trunk group load analysis

Day trunk group load analysis

Date : 7/13/12

Hour	Incoming call count + Outgoing call count	Duration	Erlang
8:00:00 AM	307	20:11:35	20.19
9:00:00 AM	848	77:39:27	77.66
10:00:00 AM	1156	122:03:48	122.06
11:00:00 AM	1301	133:09:30	133.16
12:00:00 PM	485	25:51:50	25.86
1:00:00 PM	500	53:34:59	53.58
2:00:00 PM	1045	129:35:44	129.6
3:00:00 PM	853	108:55:32	108.93
4:00:00 PM	1101	126:31:22	126.52
5:00:00 PM	755	71:53:42	71.89
Total	**8351**	**869:27:29**	**86.95**



2.6 Commercial conditions

OmniVista 8770 MCS Edition is orderable in Actis and eBuy.

It is possible to link the license to the OmniVista 8770 server MAC address instead of an OmniPCX attachment node.

END OF DOCUMENT